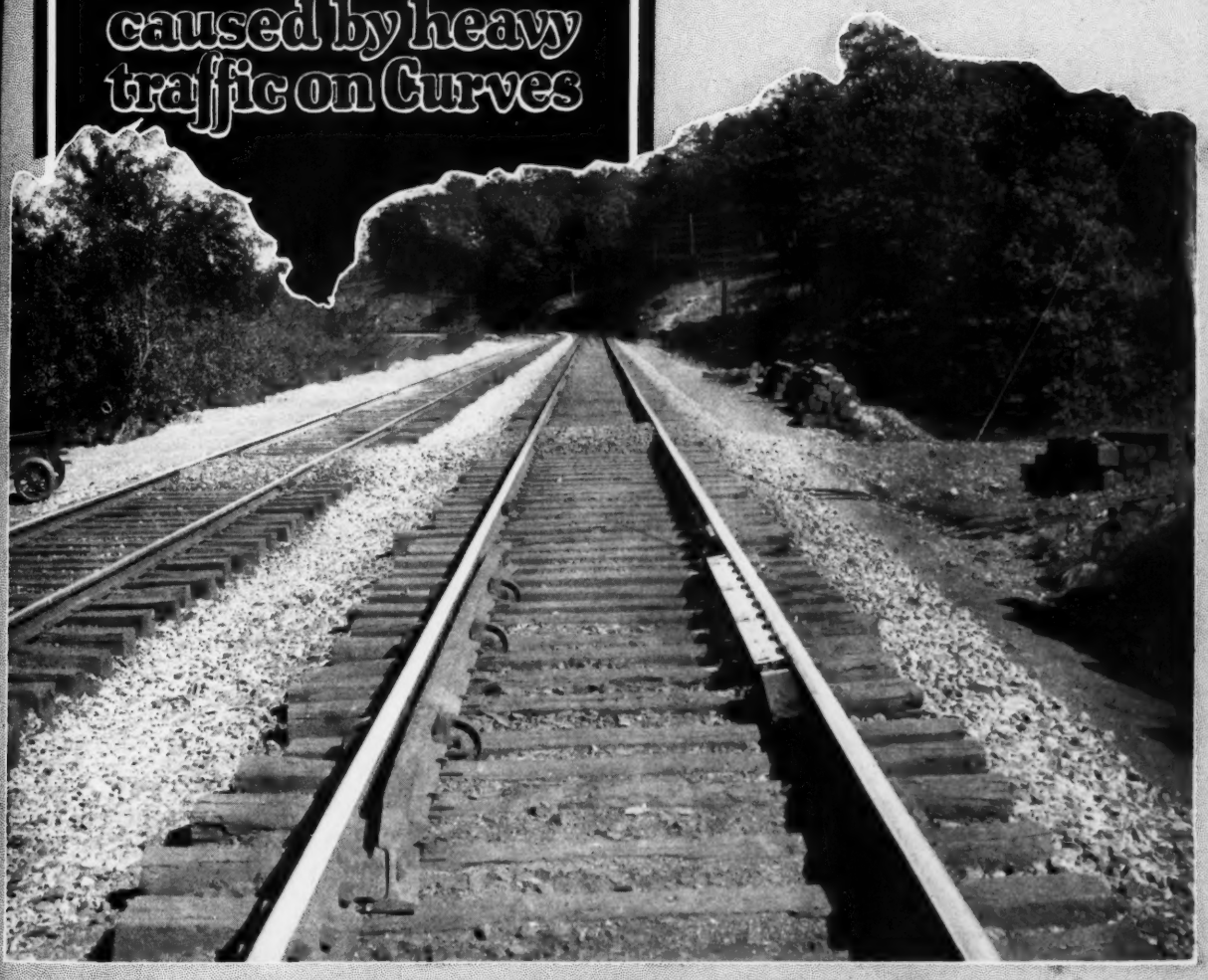
MAY, 1927

# Railway Engineering and Maintenance

Eliminates Wear on RAILS and FLANGES caused by heavy traffic on Curves

The Derrick Automatic RAIL and FLANGE LUBRICATOR



# VIBRATION - SHOCK - WEAR
## *can't loosen them*

**HY-CROME** is steadily changing the spring washer policy of many railroads. Their proven performance under all service conditions is in direct line with the present trend of lowering maintenance cost by raising the standard of operating efficiency.

Hy-Crome Spring Washers give permanent rail joint security. Vibration, shock or wear can't loosen them because they embody to an excess degree the necessary non-fatiguing spring action that constantly resists these destructive forces—and yet Hy-Crome possesses "just enough tension" to allow perfect freedom of rail movement, the greatest known preventive against battered rail ends, sheered off bolts, damaged fish plates and the costly item of frequently replacing these.

You can get "Heavy Duty," "Deflected" or just "Standard" Hy-Crome but if you want consistent economy, be sure that it's Hy-Crome you get.

**THE RELIANCE MFG. CO.**
**MASSILON, OHIO**

NEW YORK, CLEVELAND, ST. LOUIS, DETROIT, SAN FRANCISCO CHICAGO,

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Engineering Materials, Ltd., McGill Bldg., Montreal, Quebec, Canada

# HY-CROME
## SPRING WASHERS


RAILWAY ENGINEERING AND MAINTENANCE
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Alphabetical Index to Advertisers, Page 80 Classified Index to Advertisers 76-78

*Mudge Class C-1, one-man inspection car with air-cooled engine weighing less than 400 lbs.*

# *Select Timber and Motor Cars*

FORESTERS know that quality of a given species of timber may vary greatly depending on such little things as whether the tree grows on low or high ground and in an open or dense stand.

The distinction between grades of quality in motor cars is almost as slight.

Cars built, as Mudge cars are, with every condition of design and construction favorable are sure to rate at the top.

Railroad men everywhere appreciate the fact that in motor cars, "Mudge" means *Select*.

*We manufacture a complete line of railway inspection cars and section cars, side drive or center load, direct connected or free running, air cooled or water cooled motors.*

## Mudge & Company

**Manufacturers—Railroad Equipment**
**Railway Exchange Bldg. • CHICAGO**

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# Railway Engineering and Maintenance

*Formerly the Railway Maintenance Engineer*

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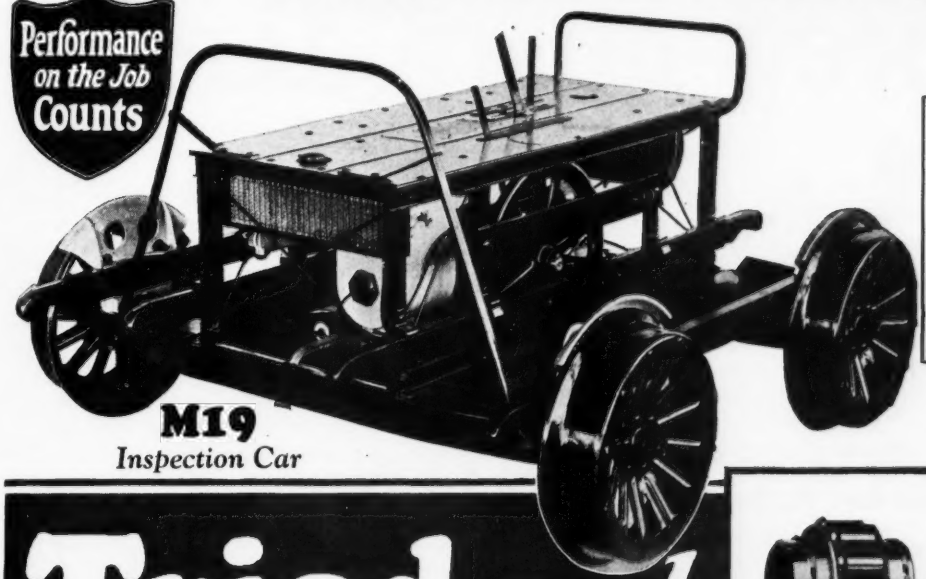
# Fairmont

Performance on the Job Counts



**M19**
*Inspection Car*

**FAIRMONT RAILWAY MOTOR CARS**

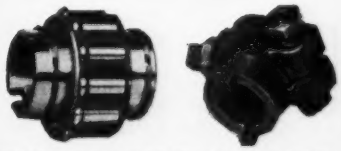
Inspection—M19

Light Section—M14

Section—A2, M2, S2

Gang—AT2, MT2, ST2

# Tried and Proved Design



RINGSEALD BEARING—Adjusting Collar
Oil-tight, Grit-proof

In the wide variety of Motor Cars, Trailers, and Car Builders' Supplies which FAIRMONT makes, every part has been designed to give superior service.

To insure the utmost in efficiency and economy at all times, FAIRMONT products are kept modern and are constantly subjected to gruelling endurance runs to prove their service capacity at our expense.

The Fairmont Ringseald Roller Axle Bearing, illustrated above, provides proper axle lubrication at all times even in spite of human forgetfulness. It holds three times as much oil by means of a "piston ring" seal. This "piston ring" seal keeps the oil in and the grit out.

Anyone can adjust a Fairmont bearing on the car—simply shift the thrust collar and tighten clamp bolt and set screw. This feature alone is an important time saver and keeps cars on the job where you want them.

*The Fairmont Line is Complete!* Five models make up the Fairmont line of motor cars, and you'll find in this complete line a model and type for every motor car use. You will be pleased to know that Fairmont improvements are adaptable to all Fairmont cars in use. Let us send you additional information; if you wish us to be specific, please state your requirements.

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*District Sales Offices:* NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO WASHINGTON, D. C. NEW ORLEANS WINNIPEG, CANADA

BALDWIN LOCOMOTIVE WORKS, *Foreign Representatives*

*Announcing*

# A NEW DUMP CAR

*by*

# Western

*for*

# RAILWAY MAINTENANCE

**Embodying :**

**Low Overall Height**
**Fast, Simple Operation**
**Small Air Consumption**
**Complete Protection of Ballast**
**Long Life and Low Upkeep**

*A word from you will bring full Information*

Better Buy WESTERNS NOW than Buy and Buy

**WESTERN WHEELED SCRAPER CO.**

**AURORA, ILLINOIS**

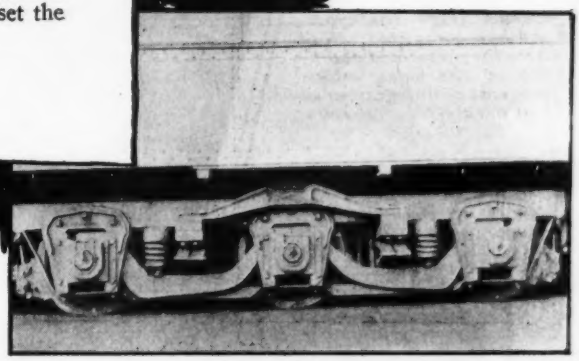
*Pioneer Builders of Dump Cars*

# Hyatt equipped of course

## *Roller Bearing Mileage*

*ONE* of the most important questions in the minds of railroad men regarding roller bearings relates to the service life which may be expected of them when applied to heavy railroad equipment. While present experience is entirely too limited to serve as the basis for definite final conclusions, there are many indications that a greatly increased mileage over plain bearings will be obtained with a minimum of maintenance difficulty and repair cost. To mention only one case, a 12-wheel roller bearing-equipped coach on the Chicago, Milwaukee & St. Paul has made a total of 300,000 miles to date, in through train service between Chicago and the Pacific Coast. This car makes a round trip of approximately 4,400 miles every nine days, or about 14,700 miles a month, not having been in the shop for heavy repairs since the application of the roller bearings. A recent check showed no perceptible wear of the bearings which it is conservatively estimated will make at least double their present mileage and probably more. One reason for the recent action of a number of roads in specifying roller bearings on extensive orders for new car equipment is to enable these roads to determine for themselves by service tests over a period of years whether the admitted advantages of roller bearings can be obtained without maintenance difficulty and expense to offset the savings.

**From March 5th. Railway Age**



**Uninterrupted bearing service through elimination of hot boxes—greater mileage at lower cost—smoother starts—quicker acceleration—worthwhile oil savings. All these Hyatt contributions have resulted in new measures of operating efficiency and economy.**

**In every kind of equipment today the Hyatt Roller Bearings are giving comparable service. Specify them.**

The truck shown above is one of the two Hyatt equipped six wheel trucks on the Chicago, Milwaukee and St. Paul coach whose wonderful record of performance is so much discussed today.

HYATT ROLLER BEARING COMPANY

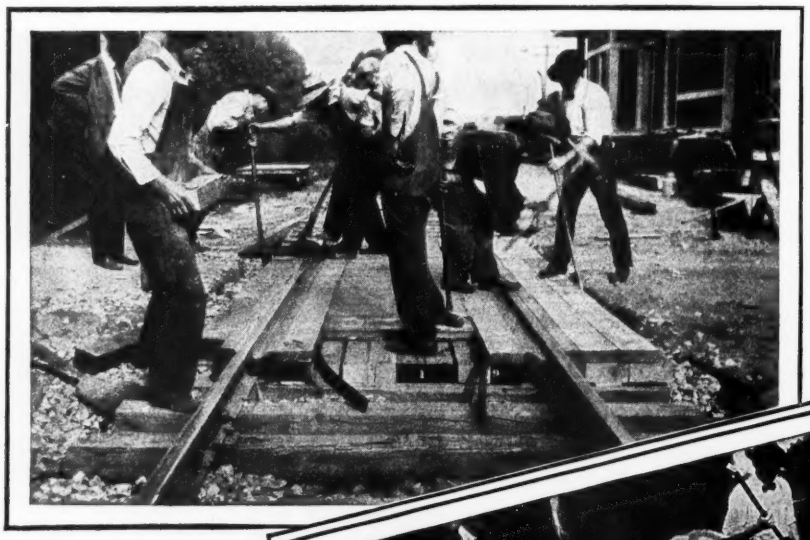
Newark Detroit Chicago Pittsburgh Oakland

# HYATT

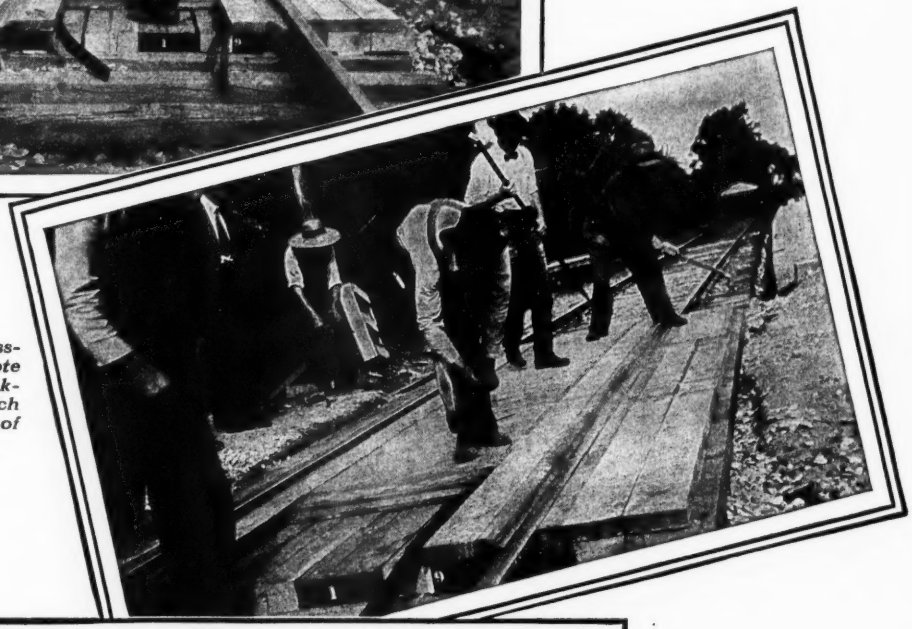
## ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

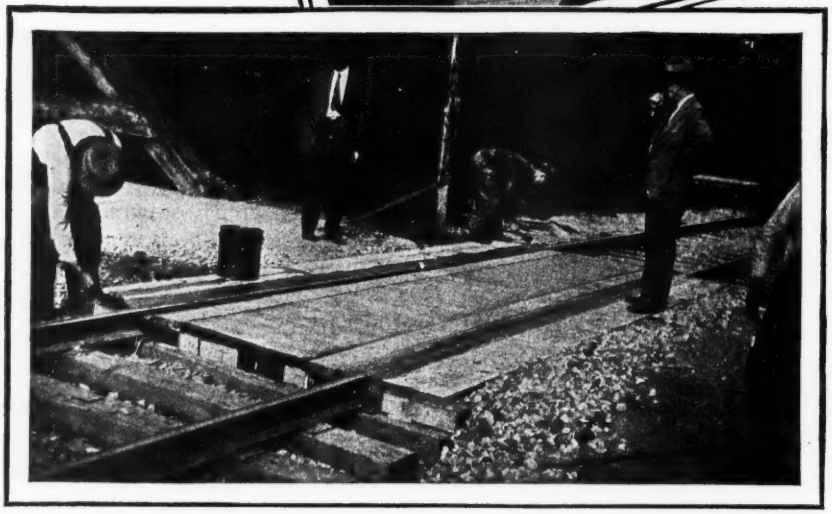
# No more "*patching*"



*In this initial stage, note the preformed slabs, laid over wooden stringers; also the strips of Carey Elastite Expansion Joint, which absorb vibration and insure a smooth, resilient surface.*



*Second stage—the crossing half completed. Note here the preformed planking at the sides, which prevents disintegration of the paving.*



*The crossing practically completed. The edges of the preformed pavement and stringers are Carey-painted to prevent water seeping under the crossing.*

# no more replacements
## ...for *now* it's a *Carey* crossing!

ON the opposite page are pictured three successive stages in the installation of a Chesapeake & Ohio R. R. crossing, at Westham, Virginia.

From now on, there'll be no more makeshift "patching"—none of the usual temporary replacements. For this improved crossing is made of Carey Elastite Preformed Track Pavement, which knits and heals—actually improves—with the heavy, jarring thumps of loaded trucks.

*Carey Elastite Preformed Track Pavement is a part of the track—it rests on a single, solid foundation. When the track moves, Carey Elastite Preformed Track Pavement moves with it. Inexpensive, easily installed with ordinary tools—it presents a smooth-riding surface, impervious indefinitely to the combined attacks of weather, time and traffic.*

*Have us tell you all about this improved grade crossing pavement. Write today for full information.*

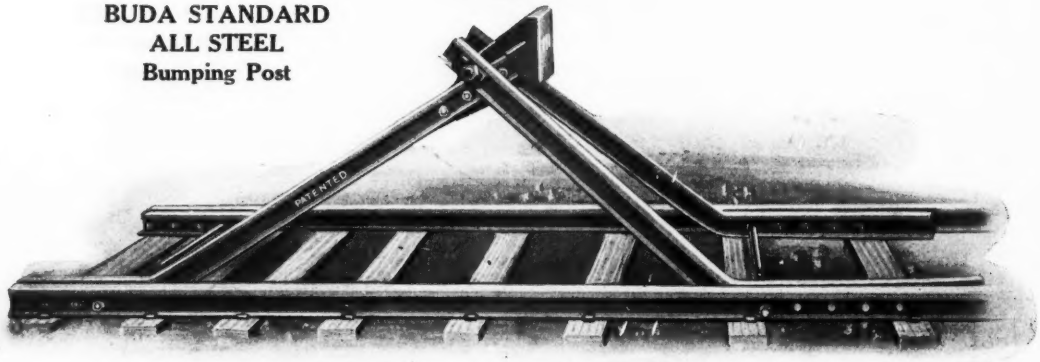
THE PHILIP CAREY COMPANY
Lockland, Cincinnati, O.

Carey Elastite
TRADE MARK REG. U.S. PAT. OFF.
PREFORMED TRACK PAVEMENT

*"Knits and heals under traffic"*

BUDA
ESTABLISHED 1881

BUDA STANDARD
ALL STEEL
Bumping Post




# BUDA ALL-STEEL BUMPING POST

**The long angle of the rear legs provides resiliency not found in any other construction. The shock of impact is transmitted to the ground with a minimum strain on the front legs—and** *without damage to the post or to the equipment.*

## All parts of the Buda Post are above the ground—

*Standard Post 6′ 7″ from front face of Bumper to end of rear legs.*
*Short Post for restricted space—3′ 4″ from front face of Bumper to end of rear legs.*

Easily and quickly installed even in frozen roadbed.

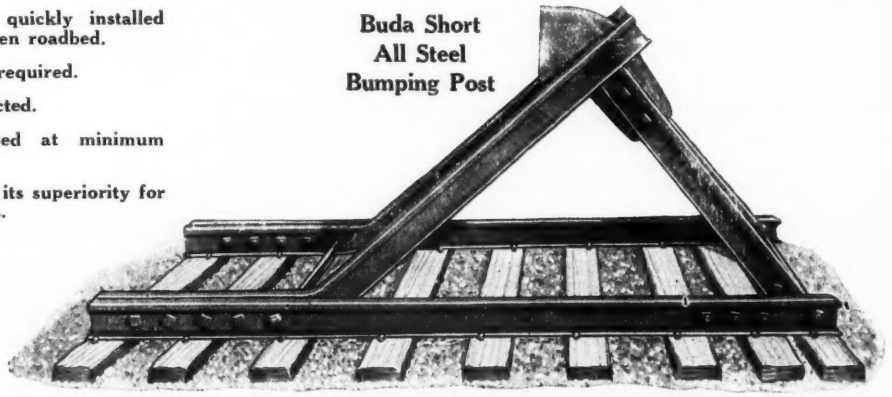
No digging required.

Easily inspected.

Easily moved at minimum cost.

Has proved its superiority for fifteen years.

Buda Short
All Steel
Bumping Post



*Send for Catalog 573*

Designed for installation where available space will not permit the longer Standard Post

The Largest Manufacturer of the Most Complete Line of Railroad Materials and Track Supplies

THE BUDA COMPANY

HARVEY (CHICAGO SUBURB) ILLINOIS

NEW YORK. CHICAGO. ST. LOUIS. ATLANTA. SAN FRANCISCO. LONDON

# *Again the years repeat the message*

# *—for durability,*
# pure iron corrugated culverts

PROBABLY there is no place in road construction where durability is more essential than in culverts. Buried away they receive little or no attention —yet it is of utmost importance that they function with unfailing certainty.

On this 31st anniversary of the corrugated culvert, it is significant to note that of the many *black iron* culverts installed by the inventor, James H. Watson, more than 85 per cent are in service today.

The purity of the iron in these original culverts has been preserved and improved throughout these years by ARMCO—today and for many years the only pure iron made. A five year investigation—nationwide, covering thousands of culverts—has proved (1) that only a flexible culvert can endure under field conditions—most culverts fail through fracture, (2) that pure ARMCO Iron is the answer to corrosion.

Because of ARMCO dependability, the Association has adopted a policy of urging culvert buyers to make an unbiased investigation in their locality—"Look Under Your Roads." ARMCO engineers will gladly demonstrate ARMCO durability from records of actual service.

ARMCO CULVERT MANUFACTURERS' ASSOCIATION
MIDDLETOWN, OHIO

# ARMCO CULVERTS

***Predominant in use because predominant in quality—"Look Under Your Roads"***

SERVICE TO
RAILROADS
Based on Years of Contact
For years and years the Illinois Steel Company has been closely associated with railroad requirements. Its personnel has been schooled in the careful handling of railroad business.
Orders for *Bolts and Spikes* entrusted to Illinois Steel Company will at all times receive the prompt and intelligent attention that this specialized service demands.
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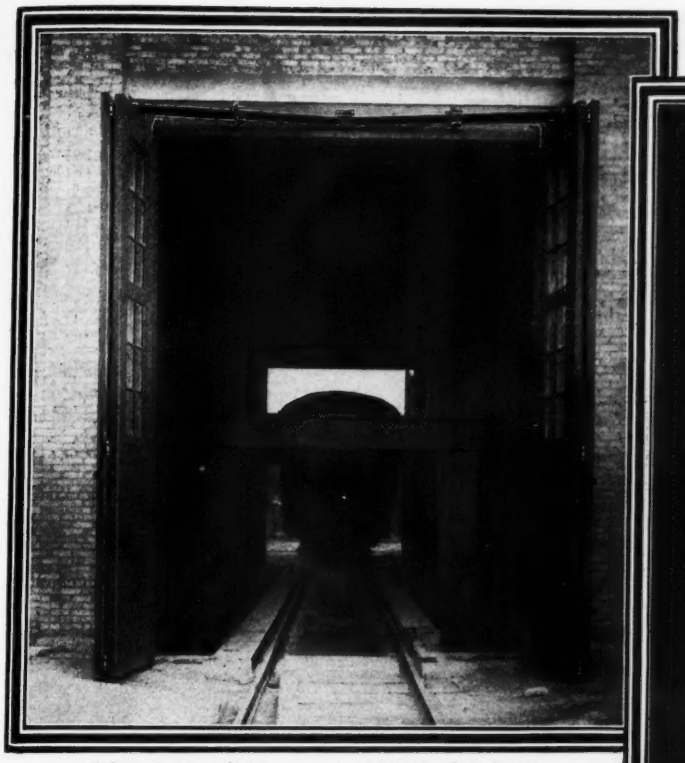
Chicago, Illinois
ILLINOIS
STEEL PRODUCTS
Carefully Inspected–Always Uniform



*Slidetite* Industrial Equipment in Rock Island Railroad, 47th Street Shops, Chicago

*Slidetite* Industrial Equipment in Locomotive Shops of Southern Pacific Lines, Los Angeles

# *Industrial Slidetite* meets exacting requirements of large doorways in railroad shops

THERE is no place in any *business* building for doors that won't work—instantly, smoothly, every time.

*Slidetite* Industrial Door Hardware solves doorway problems. *Slidetite* Doors fold back easily; stay where they are put; close smoothly and tightly. It is their smooth ease of operation and long life which have given *Slidetite* equipped doors such wide popularity for railway shops; and in all industrial buildings with doorways up to 30 feet wide. *Slidetite* provides a clear, unobstructed opening regardless of the width of the doorway.

It doesn't pay to skimp on your door hardware—it is costly in the long run. Use *Slidetite*; you play absolutely safe.

**Richards-Wilcox Mfg. Co.**

"A Hanger for any Door that Slides"

**AURORA, ILLINOIS, U.S.A.**

New York Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Chicago Minneapolis Kansas City Los Angeles San Francisco Omaha Seattle Detroit. Montreal · RICHARDS-WILCOX CANADIAN CO., LTD., LONDON, ONT. · Winnipeg

(831)

*Largest and most complete line of door hardware made*

# More shovelsful per day more days per shovel—

**7 Reasons for Using Oliver Ames Shovels**

1. The OLIVER AMES BEND the perfect shovel balance; often copied, never duplicated.
2. Blade of heat-treated alloy steel with maximum resistance to wear.
3. Finest craftsmanship, as details of finish readily prove.
4. Lightest weight construction consistent with strength.
5. Best handle known, genuine Northern Ash, second growth.
6. All Dee-Handles, supplied in OLIVER AMES Split Dee, I-D-L, Sturd-E, Wright Metal or Wooden Dee.
7. Distributed by best dealers throughout the world.

That's why maintenance of way men and roadmasters prefer OLIVER AMES Shovels.

More shovelsful per day because the celebrated O. AMES Bend in the selected second growth Northern ash handle makes it much easier for the workman to fill his blade to capacity with less effort.

More days per shovel because OLIVER AMES Shovel blades are made from special analysis alloy steel treated to resist wear and withstand severe usage. They are properly fitted with perfectly balanced and well finished handles.

Catalog of all sizes and types will be sent you on request.

**O.AMES SHOVELS**

**SHOVELS-SPADES-SCOOPS**

*At good supply houses everywhere*

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TRADE MARK REGISTERED

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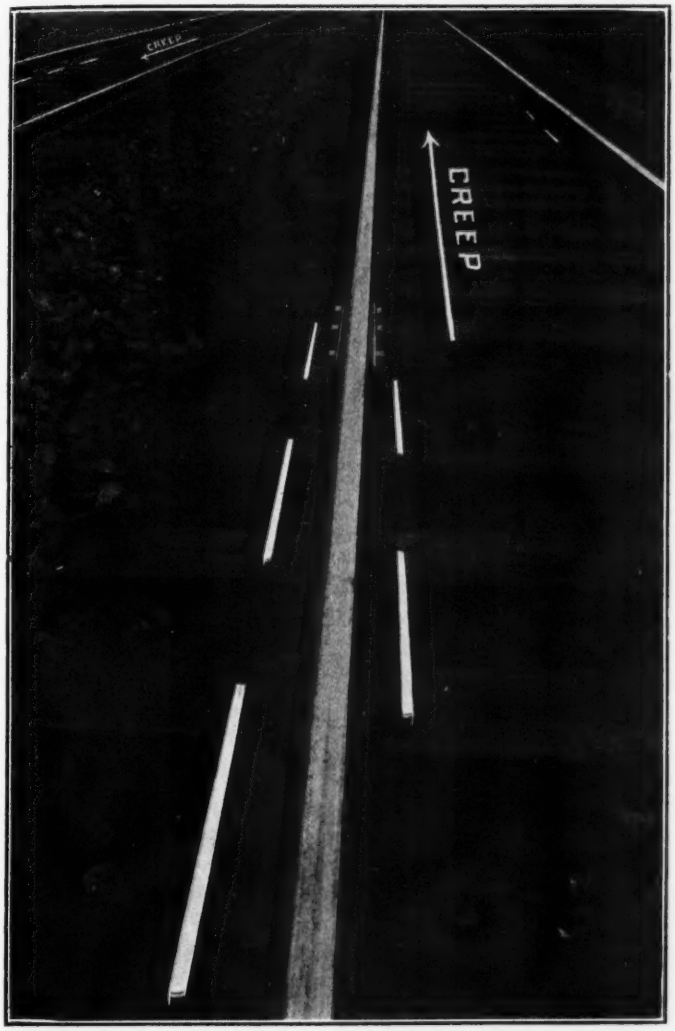



THEY MAY BE INSTALLED OUTSIDE THE GAUGE—INSIDE THE GAUGE — OR ALTERNATED AS SHOWN IN THE ILLUSTRATION

## "U" SPIKES

TRASCO "U" SPIKES ARE A PREVENTIVE FOR CREEPING TRACK.

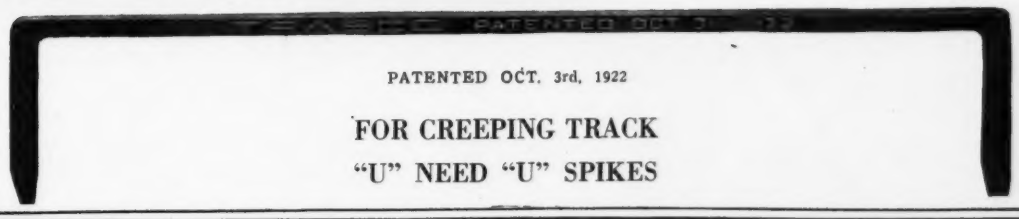
THEY HAVE BEEN IN USE FOR SIX YEARS, AND ARE PERFORMING SATISFACTORY SERVICE.

LOWEST PRICED RAIL ANCHOR ON THE MARKET.

THEY ARE SOLD UNDER THE TRASCO GUARANTEE.

*Send Us Your Inquiries for Rail-Anti-Creepers*

NOTE:—Don't Be Afraid to Hook Them to the Joint Ties.
The Creep of One Rail Never Injured the Joint Spikes.
It's the Accumulated Stresses for Miles That Does the Damage.




PATENTED OCT. 3rd, 1922

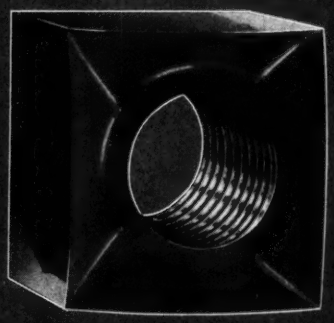
FOR CREEPING TRACK
"U" NEED "U" SPIKES

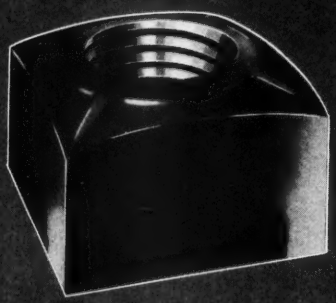
TRACK SPECIALTIES CO.

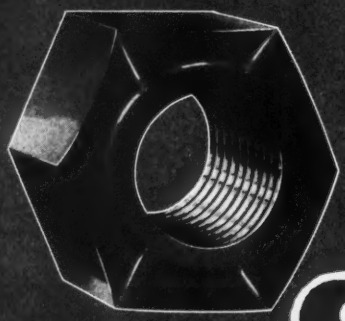
29 BROADWAY
NEW YORK

# They lock on every thread!

ORIGINAL in principle and design, Selflock Unit Nuts give to industry the first positive gripping nut that holds tight under all conditions of vibration and strain.







"The Nut with the Star Crown"

# SELFLOCK UNIT NUTS

Every Selflock thread forms a double frictional lock thus giving the largest gripping area of any locking nut ever devised. The actual frictional area of a 1-inch Selflock Nut, for example, is 6 square inches.

This multiple-friction lock of the Selflock Unit Nut assures you not only the maximum resistance to vibration, but also a nut that will not wear out. It will fit any standard threaded bolt and can be applied from either face repeatedly.

SELFLOCK Unit Nuts are especially applicable to freight cars and locomotives, track and crossover bolts, forging and pressing machines and similar applications where severe vibration is encountered.

## Graham Bolt & Nut Company

## Pittsburgh

*Established 1874*

# The Q & C Manganese One Piece Guard Rail

## Used by the Leading Roads Throughout the Country

Q & C Manganese One Piece Guard Rails have the combination of strength and durability; strength, because they are made under ideal foundry conditions of full manganese steel, giving a casting which is uniform throughout; durability, because of the exceptionally strong design embodying arches between the ties.

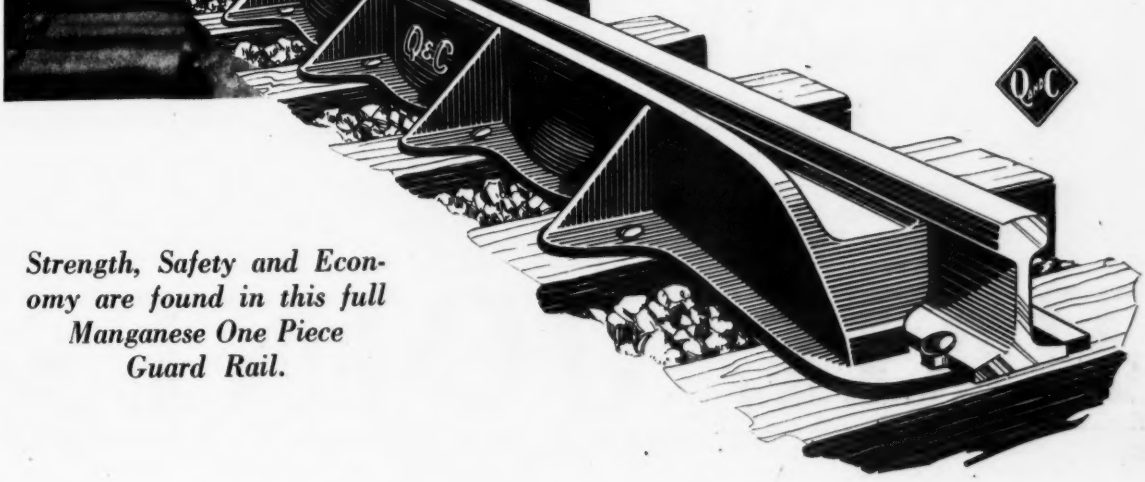
The base plates are wide, assuring a firm bearing and eliminating any cutting into the tie. This casting is designed so that it is self cleaning, eliminating any trouble with snow, ice and cinders.

Being made in one piece, they are easy to install and minimum maintenance is required. We are prepared to furnish a guard rail for your standard requirements, and would be glad to forward our latest printed matter giving complete description of the Q & C Manganese One Piece Guard Rail.

## THE Q & C COMPANY

**90 West Street, New York**

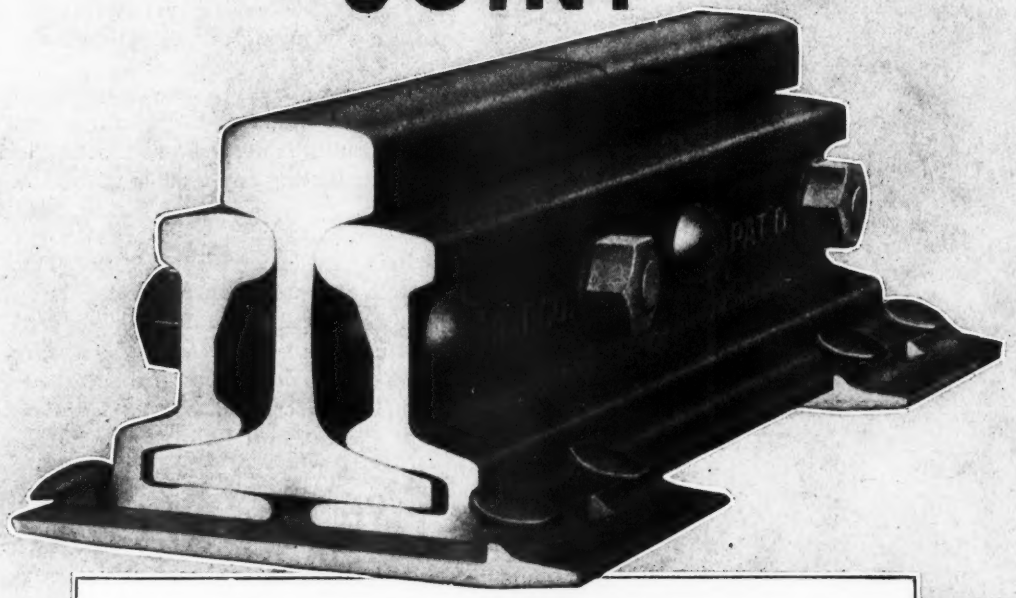
**Chicago** **St. Louis**




*Strength, Safety and Economy are found in this full Manganese One Piece Guard Rail.*

KEEPING PACE WITH PROGRESS

HEAD FREE Continuous JOINT



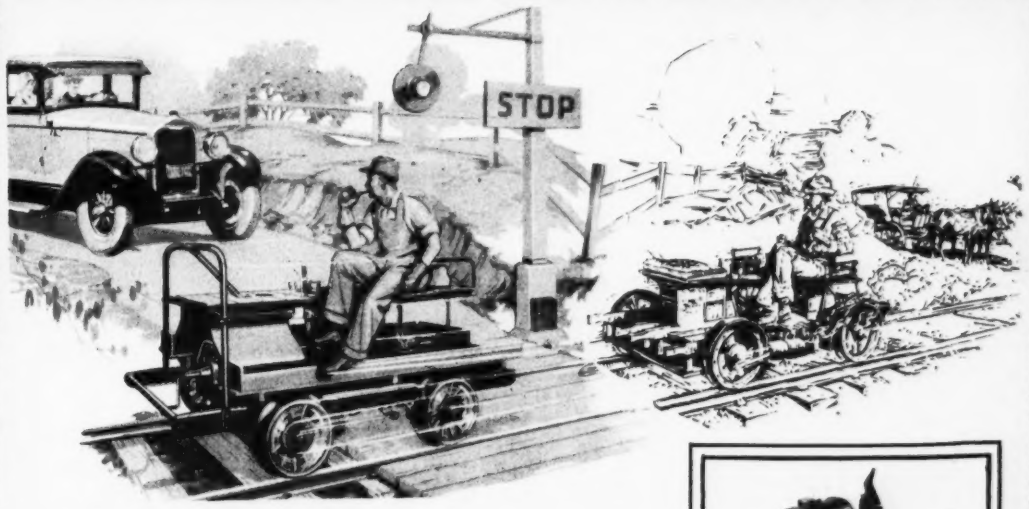
THE Head Free fillet bearing area can never be diminished.

A cocked Head Fishing bar reduces the head bearing to almost a line.

THE RAIL JOINT COMPANY

165 Broadway, New York City

RAIL JOINTS




# When leadership pays you a dividend—

The Fairbanks-Morse Motor Car of today offers value that was not even dreamed of in the days when we built the first of all engine-driven section cars. Yet there is nothing startling about this. It is simply another repetition of the old story of a manufacturer's leadership paying a dividend to the purchaser.

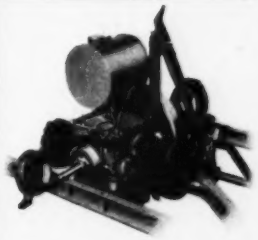
With the ever-growing demand for cars of Sheffield quality have come finer and finer production facilities—reduced manufacturing costs—savings that are re-invested in refinements that would ordinarily be considered prohibitive in section cars.

Features like three-point suspension, Timken Tapered Roller Bearings, and auto-type pressed steel frames are typical of the *plus values* of the entire Sheffield line. These are your dividends—paid in quality by the cars that *were* and *are* "*first on the rails.*"

## FAIRBANKS-MORSE
## MOTOR CARS

*First on the rails—and still first*

TIMKEN EQUIPPED

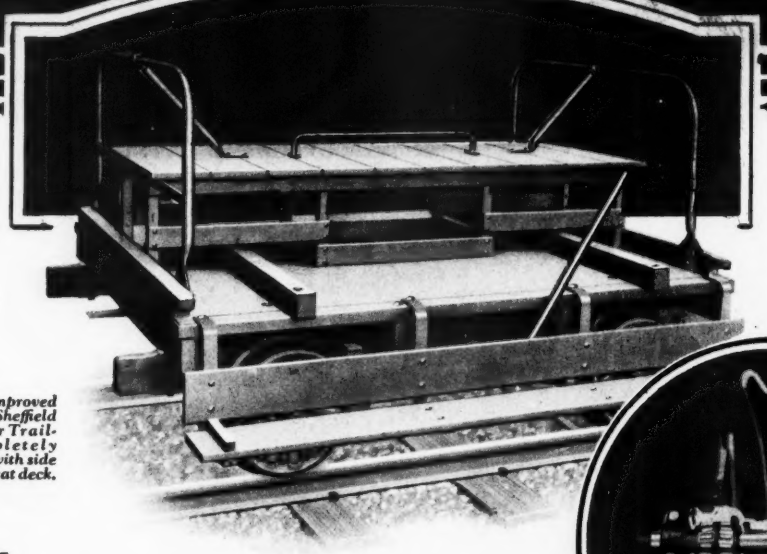


## Three-point suspension

*—a typical Sheffield refinement*

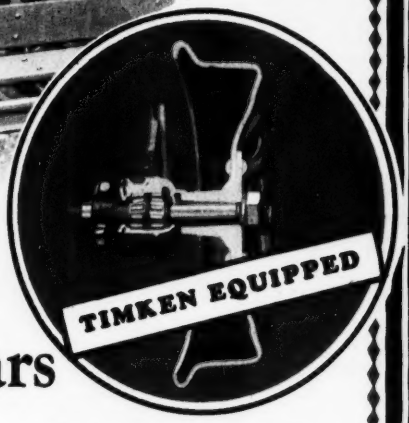
One of the many evidences of the high engineering standards followed in building F-M cars is the method of mounting the engine in the Sheffield "40-B" and Sheffield "45."

The engine is mounted on the frame at three points, a type of construction conforming with accepted automobile practice. The front part of the engine is mounted in a cradle or circular bearing support, as shown in the accompanyingillustration. This bearing relieves the entire engine of any strains incident to flexing of the frame. Misalignment is positively prevented and no cramping strains can be imposed upon the engine nor exist between the engine and transmission.



*New and improved design of Sheffield Motor-Car Trailer, completely equipped with side steps and seat deck.*

*Section of double Timken Tapered Bearing, dust-proof axle box and Sheffield Pressed Steel Wheel*




# *Now* a great advance in trailers and push cars

By designing push cars and trailers in which every part is engineered to carry forces and stresses in the most direct and efficient way, a new degree of strength and durability has been achieved without adding superfluous weight.

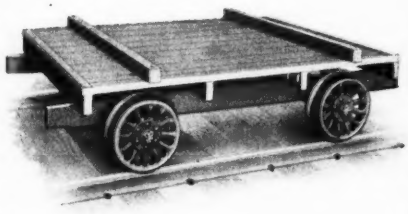
Examples of this are the use of dump sills which support the heavier loads—such as rails, frogs or ties—directly over the axles; the application of Timken Tapered Roller Bearings mounted in an advanced type of axle boxes; the use of improved adjustable toggle brakes with greater braking power; and the application of two bronze-bushed loose wheels with grease cups.

Probably the most outstanding of the many unusual features are the double Timken bearings mounted in dust-proof boxes and conveniently oiled through holes in the deck which communicate with oil tubes reaching to the axle boxes. The superiority of Timken bearings for handling a combination of thrust and radial loads has been well demonstrated throughout the automotive field.

The wheels are the well-known 16-inch Sheffield Pressed Steel type—the type that is used on Sheffield Motor Cars. Frames are of carefully selected hard maple, and wherever two sills are joined they are gained into each and tightly bolted.

As a result of the many improvements, the capacities of these push cars and trailers have been increased to 6,000 pounds for the 4-B, and 10,000 pounds for the 12-B, with the same liberal factor of safety that formerly applied to 4,000 and 8,000-pound ratings.

Cars are furnished either as push car without brakes as illustrated at the left, or (1) with brakes, (2) as trailer with draw bar and coupler, (3) with seat deck, and (4) with side steps. These push cars and trailers are fully described in a new bulletin. Write for it.



*Modern engineering principles have been incorporated in the design of 4-B and 12-B Push Cars*

FAIRBANKS, MORSE & CO.
*Chicago*

# FAIRBANKS-MORSE

## MOTOR CARS, TRAILERS *and* PUSH CARS

ARA21.22

# Better Transportation

Better transportation means more rapid and economical moving of freight and passengers from place to place.

So many elements contribute to smooth operation that it is impossible to single out any one thing and say—"This is the primary cause."

But it is certain that Oxweld Railroad Service is a positive factor—and the reason why a large majority of the railroads of the country have Oxweld Railroad Service contracts.

The wide range of oxwelding supervision that is placed at their disposal through the Oxweld Railroad Service staff is an important aid in keeping traffic moving efficiently.

THE OXWELD
RAILROAD SERVICE COMPANY
*Unit of Union Carbide and Carbon Corporation*

UCC

Carbide and Carbon Building, New York City
Railroad Exchange, Chicago

Oxweld
Railroad Service

# "No Case has ever come to light where Cast Iron Pipe ever wore out under average service conditions"

Water and Gas distribution systems, that have been using Cast Iron Pipe for the past one hundred years, have not yet been in existence long enough to determine the working limits of this pipe.

That is why the trend today is all toward the use of Cast Iron Pipe for water and gas distribution systems. Once properly laid under pavement, Cast Iron Pipe mains are free from the enormous costs of repair under paving and the correspondingly unpleasant effect upon the public.

*Cast Iron Pipe dug up in Baltimore in 1916—Underground since between 1820 and 1835*

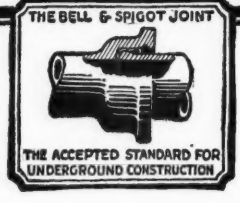
No case has ever come to light where Cast Iron Pipe ever wore out under average service conditions.

This Bureau is organized to assist in any phase of the use of Cast Iron Pipe.

*Address:* RESEARCH ENGINEER
THE CAST IRON PIPE PUBLICITY BUREAU, PEOPLES GAS BUILDING, CHICAGO

**CAST IRON PIPE**

*Our new booklet, "Planning a Waterworks System," which covers the problem of water for the small town, will be sent on request*




*Send for booklet, "Cast Iron Pipe for Industrial Service," showing interesting installations to meet special problems*

*Kyrock Station Platforms on L. & N. R. R. at Richmond, Ky.*

*Approximately 1 inch compacted Kyrock on broken stone base. Laid 1926. A Kyrock wearing surface is smooth, resilient, non-reflecting and non-skid. Kyrock surfaces under traffic for years show no evidence of abrasive wear. Investigate Kyrock.*

# *Kyrock makes wear-proof platforms*

*Make This Test—*

"Kyrock" your most troublesome grade-crossing or platform, observe results and you will soon adopt it for the division. Write today for your copy of "Kyrock for Railway Construction and Maintenance."

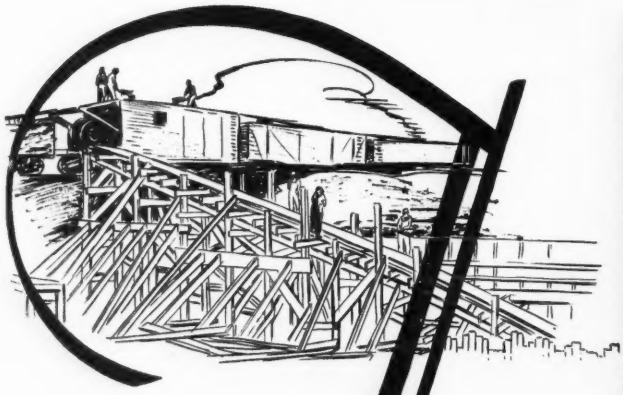
Kyrock surfacing on station platforms offers you simpler construction, longer life, less maintenance and an ideal traffic surface. Kyrock is laid *cold.* Shovel it on, rake it to grade and tamp or roll—that's all. Converts cracked concrete, worn brick, block and macadam platforms, runways, shop floors into smooth, resilient, non-skid pavements. Perfect waterproofing and non-conductor. Ships in open top cars. Stores in the open without damage. *Investigate Kyrock.*

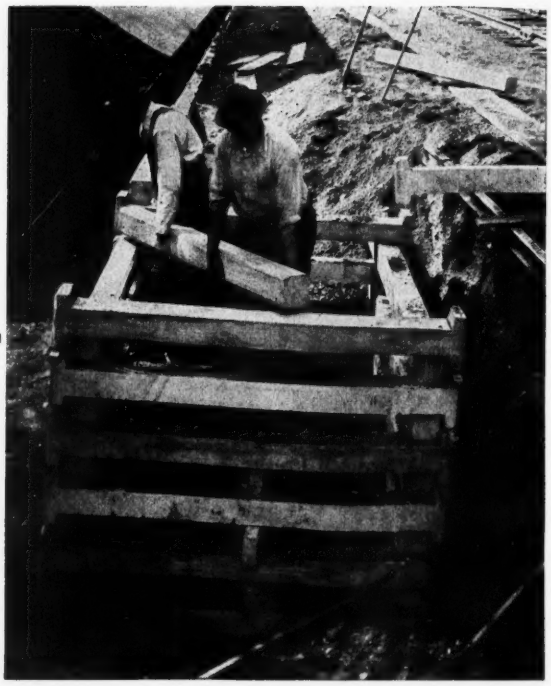
KENTUCKY ROCK ASPHALT CO., Incorporated, LOUISVILLE, KY.

# Kyrock

## The Perfect Pavement

KENTUCKY ROCK Kyrock ASPHALT





# This construction equipment is unnecessary - when you use concrete cribbing

The construction of a monolithic retaining wall requires a mixing plant, material cars, forms, chutes, etc. In most cases the construction of such a wall along an operated line means interference with traffic and it always means a high cost for the wall.

Contrasted with this, Massey Reinforced Concrete Cribbing Units come to the job ready to lay in place. They are manufactured under ideal conditions in the plants where Massey pipe and other precast products are made. No special equipment of any kind is rquired to lay a Massey Cribbing Wall. Low cost and minimum interference to traffic are the natural results.

Massey Cribbing is meeting the most exacting requirements of railway engineers. We will gladly send literature or have a representative discuss any retaining wall problems you are considering.

# MASSEY

Concrete Products Corporation, Peoples Gas Building, Chicago

Sales Offices: New York, Atlanta, Cincinnati, St. Louis, Los Angeles

Canadian Concrete Products Co., Ltd., Transportation Building, Montreal, Que.

*Massey Cribbing is produced in the same plants and is of the same high quality as Massey Culvert Pipe and other precast concrete products which have been standard construction on the leading railroads for years.*

RE5-Gray

**UNIVERSAL** **SAFE** **ECONOMICAL**

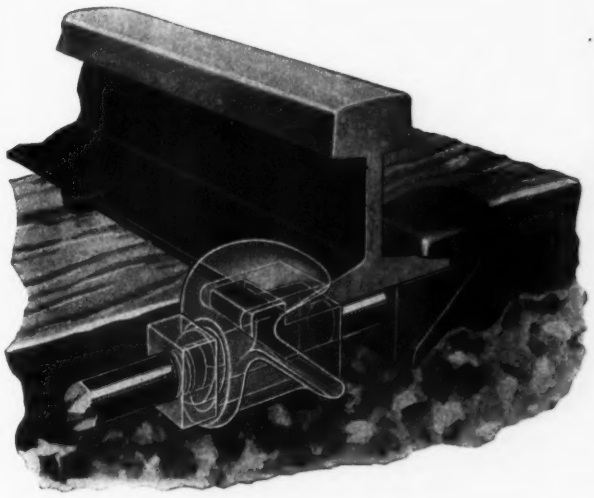
# THE COOVER UNIVERSAL CLUTCH BRACE

The COOVER UNIVERSAL CLUTCH BRACE for standard and narrow gauge tracks combines in one device a BRACE, TIE-ROD, ANTI-RAIL SPREADER, TILTER and CREEPER.

ESPECIALLY RECOMMENDED for use on curves, switches, wyes, terminals, yard tracks, ash pits and wherever proper maintenance of track is difficult.

ADVANTAGES—Under Coover Construction the rail strain is equally distributed to all parts of the track, because they grip both the inside and outside flanges of the rails with a vice grip, and join the two rails together so as to form a unit of the two rails. Thereby they cause the force to be distributed to all parts of the track equally, rather than at point of contact.

The Unit formed causes one rail to bear the strain of the other and one spike to bear the strain of the other.



Any unskilled labor can apply this brace after rails are laid in less than five minutes.

Coover Braces will hold the sharpest curves true to gauge no matter what your track conditions may be.

They prevent spreading of rails and the crowding of outer spikes, also tilting of rails and lifting of inner spikes, and by applying against the tie they prevent creeping of rails.

Labor costs are greatly reduced through the elimination of frequent respiking and retieing.

Elimination of frequent respiking minimizes tie-killing and the subsequent tie-replacements costs.

**Let Us Give You Further Particulars**

## THE COOVER RAILROAD TRACK BRACE CO.

DAYTON, OHIO

## JACKSON ELECTRIC TIE TAMPERS

Track labor prefers to handle these machines rather than tamp with pick or other mechanical means. They are easy on the operator and it is possible to break in an inexperienced man and obtain satisfactory results in one day.

# ELECTRIC TI

## PRODUCING A RO
## OF SUPERIOR QU

The laying of new and reconditioning of old track is being pushed at this season and roads employing the Jackson Electric Tie Tampers are making notable progress. Besides making greater progress than roads using ordinary methods a more evenly and firmly tamped roadbed is procured.

The action of the Jackson Tie Tamper is such that the ballast is tamped into place by 4,000 blows per minute, filling in all hidden voids and securing a firm evenly tamped roadbed of maximum permanence.

**ELECTRIC TAMPER & E**

RAILWAY EXCHANGE BUILDIN

**SPOTTING**

**SU**

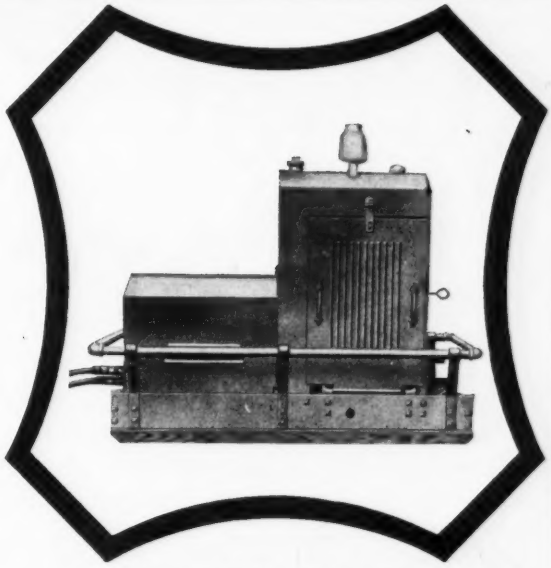
# TIE TAMPING ROADBED QUALITY

Jackson Electric Tie Tampers and Power Units stand up under the most severe and exacting service, many units placed in service over 5 years ago taking brutal punishment daily but still delivering the goods.

Now is the time, while working under full pressure, to give Jackson Electric Tie Tampers a thorough tryout.

Such a trial will undoubtedly convince you that your tamping problems can be readily met in a most satisfactory manner.

Let us prove our contention.



## POWER UNITS

Built in 3 sizes for operating 4-8-12 tamping units. Besides operating Jackson Electric Tie Tampers these units can be used for operating any of the numerous electrical appliances now used in track and bridge work. Also used for supplying current for flood lighting.

## & EQUIPMENT CO.

CHICAGO, ILL.

SURFACING

# What Price Carelessness?

THE cost of carelessness in the purchase and production of ties is enormous.

If ties are not removed from woods immediately after cutting, they will decay.

If ties are not stacked properly and watched constantly, decay will start and spread rapidly.

If anti-splitting irons are not inserted when necessary, a considerable loss of tie value results.

If a tie is overgraded one size, there is an overpayment of from 10 to 30 cents.

If ties purported to be size 3 are purchased at the size 2 price, you may find that the size 3 ties do not measure up to any more than the requirements of a size 2 tie according to specifications.

There is no short cut to the perfect production and treatment of ties—you must have sound timber and scientific treatment to get greatest economy and maximum life.

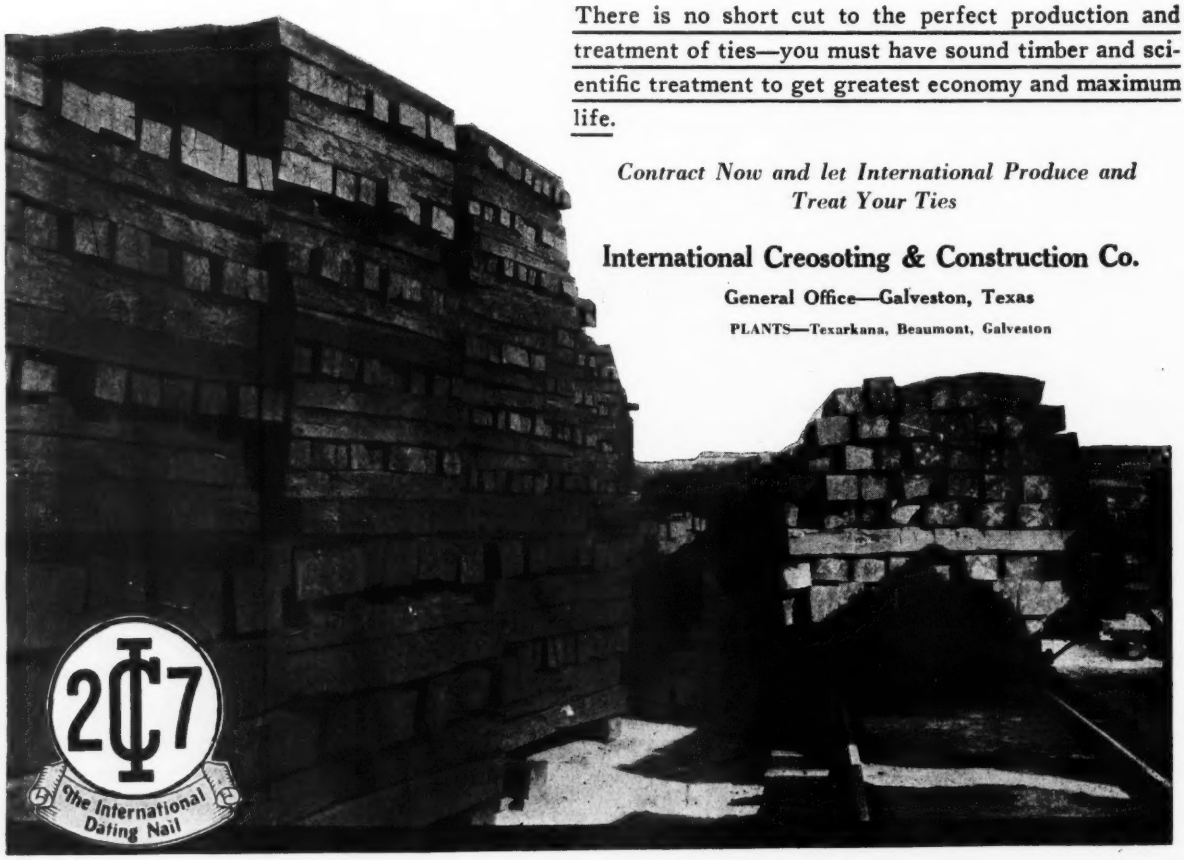
*International*
Standard A.R.E.A.
SPECIFICATION TIES

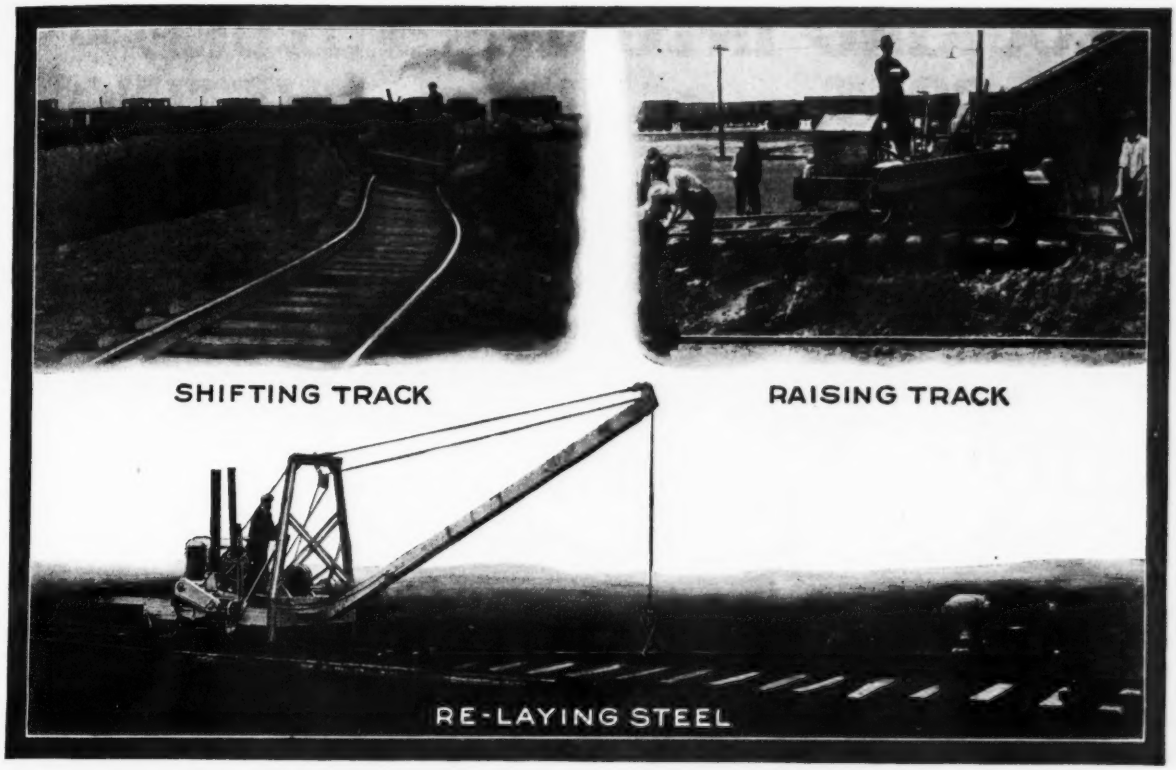
*Contract Now and let International Produce and Treat Your Ties*

**International Creosoting & Construction Co.**

General Office—Galveston, Texas

PLANTS—Texarkana, Beaumont, Galveston






# STOP *that unnecessary labor expense of doing track work by hand*

If you have been seeking an all-purpose machine for your track work, one that will reduce your labor expense on different kinds of jobs, here is the machine you are looking for.

Use it for shifting track on new yard construction, disposal dumps or any place where track must be moved laterally. By the addition of an inexpensive leveling device it is equally suitable for raising track as for ballasting, grade elevation, fills, coal pile storage, etc. The operator and a few men will shift or raise as much track as 80 men can do with bars and jacks.

By the addition of a hoist and boom you can use it for re-laying steel. Its 40 horsepower motor propels it at a speed of 25 miles an hour, permitting it to be also used for transporting men and material. Changing the machine from one job to another requires but an hour's time.

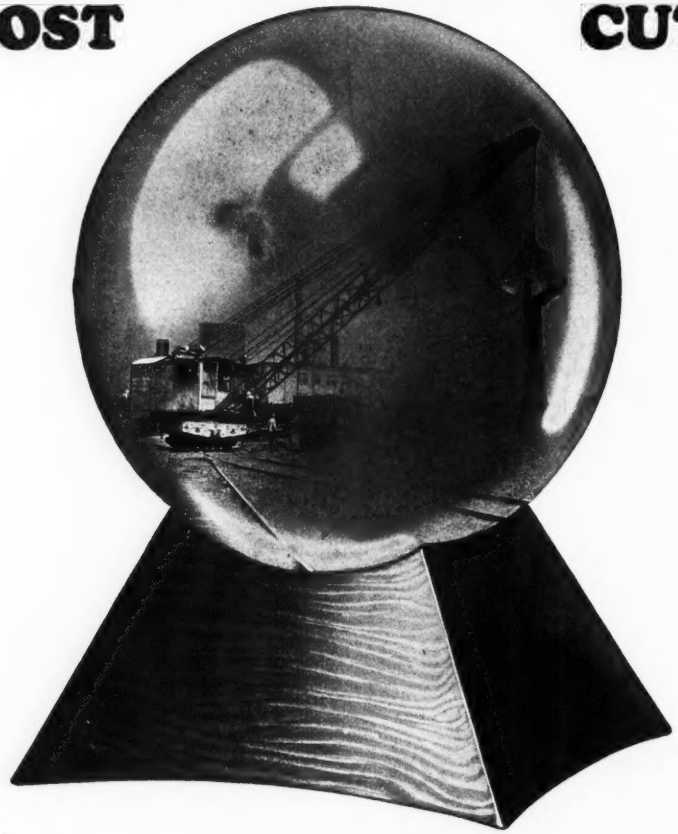
Why tie your money up in a machine that is only suitable for one kind of track work? The Nordberg Track Machine is one that can be kept busy on all your track jobs. By keeping it busy it will bring the greatest return on the investment. Idle machinery brings no return.

With the development of this unique machine, no one can longer afford to maintain an expensive track gang using old time hand methods. Write us about your track jobs and we will show you how the Track Machine saves money. Bulletin YE-8 describes it.

**NORDBERG MANUFACTURING COMPANY, Milwaukee, Wis.**

## THE NORDBERG PATENTED TRACK MACHINE

# LOOKING INTO THE FUTURE — OF COST CUTTING



*"Locomotive cranes . . . are finding an endless field for the production of economy and avoidance of concentration of large masses of men for common and arduous labor."*

This is quoted from a recent article by C. C. Cook, maintenance engineer of the B. & O. It is not theory. Mr. Cook substantiates his statement with actual figures—a saving of $1,690.00 per mile, or 67 percent effected by cleaning stone ballast with ten men and one locomotive crane instead of employing a gang of sixty common laborers.

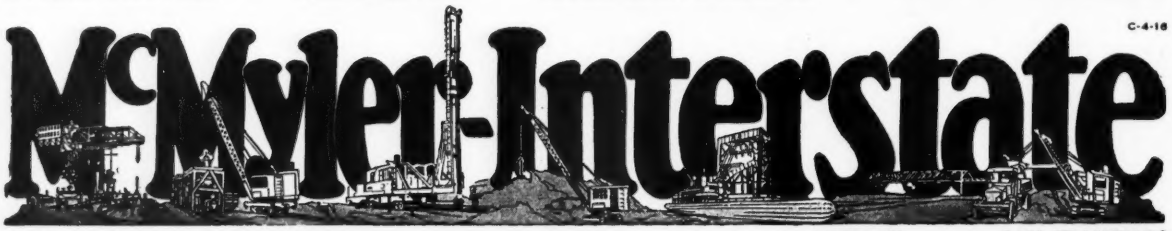
One road, pioneers in the use of cranes, now assigns sixty-six operations to this equipment. The economy and saving effected is tremendous. It is inevitable that recognition of this economy will come.

The McMyler-Interstate Company has prepared for this inevitable demand. Modernization has been the key-note of our activities. This is exemplified by the development of the Bob-tail crane having the short rear swing, eliminating interference with traffic on adjacent tracks. In addition to being able to supply standard cranes ranging from 10 to 60 tons, we are ideally equipped to work out any special developments.

Our service to the railroads is only limited by the opportunities afforded us.

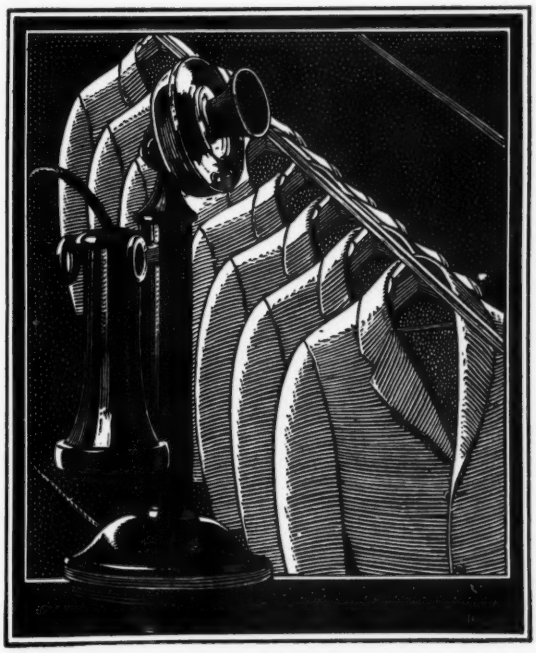
**Steam Shovels • Gas Shovels • Locomotive Cranes • Clam-shell Buckets**

C-4-16




NEW YORK
BUFFALO
PHILADELPHIA
PITTSBURGH
**CLEVELAND**
DETROIT
CHICAGO
SAN FRANCISCO
LOS ANGELES

# Why not call them up *Long Distance* order more



A MADISON, WISCONSIN, clothier found that he was having a run on a special suit of collegiate type. He called the Chicago manufacturer on Thursday morning. Eight suits arrived on Friday. The entire lot was disposed of Saturday. "Had it not been for the telephone," he writes, "we would not have been able to satisfy the demand for a week-end business so profitable to us."

FROM ALL PARTS of the country comes similar news. From Wheeling, West Virginia: "A tremendous demand for slickers caused us to save many sales that would have been lost, had we not used the long distance telephone to secure immediate shipments." Louisville, Kentucky: "We use Long Distance for making purchases ... for hurrying along information and shipments. ... In many cases it has saved us trips to market." Rochelle, Illinois: ". . . not a week goes by but we use Long Distance to take care of rush orders. . . . The only satisfactory way." Cincinnati: "Long Distance in our case is just as important as the local telephone."

There's scarcely a business in this country that could not use long distance calls to cut costs, save trips and get needed goods. They'll nearly always cost less than you think. . . . *Number, please?*

BELL LONG DISTANCE SERVICE

TONCAN
COPPER
Mo-lyb-den-um
IRON

TONCAN IRON is an old "railroader". For years and years it has been giving dependable service in corrugated iron culverts.

For seventeen years Toncan perforated sub-drains have been draining the road-bed in "sags" and near water pans.

Time has thoroughly tested Toncan Iron and now its corrosion resistance is still further strengthened by the inclusion of copper and molybdenum.

These elements give the naturally resistant iron an additional protection against weathering and corrosion.

Specify Toncan Iron for longer life in corrugated culverts and sub-drains.

Following are the makers of Toncan Culverts. Write the nearest one:

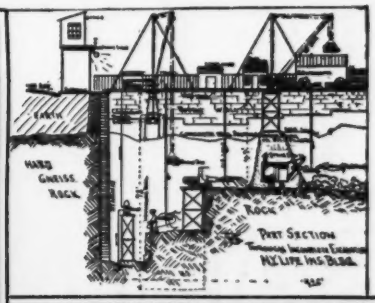
The Berger Manufacturing Co. Roanoke, Virginia
Tri-State Culvert Mfg. Co. Memphis, Tenn.
The Canton Culvert & Silo Co. Canton, Ohio
The Firman L. Carswell Mfg. Co. Kansas City, Kan.
The Berger Manufacturing Co. Minneapolis, Minn.
The Berger Mfg. Co., of Mass. Boston, Mass.
The Berger Manufacturing Co. Philadelphia, Pa.
The Berger Manufacturing Co. Dallas, Texas
The Berger Manufacturing Co. Jacksonville, Florida.
The Pedlar People Limited. Oshawa, Ontario, Canada

CENTRAL ALLOY STEEL CORPORATION, *Massillon*, OHIO

*Makers of Agathon Alloy Steels*

Cleveland Detroit Chicago New York St. Louis
Syracuse Philadelphia Los Angeles Tulsa
Cincinnati San Francisco Seattle

TONCAN IRON



# Dynamiting 50 feet through the bed rock of Manhattan

*Photographs and diagram, courtesy SCIENTIFIC AMERICAN*

BITING fifty feet into the hard gneiss rock of Manhattan Island over an area 200 by 425 feet is a tremendous engineering accomplishment. Many hundred thousand tons of solid rock had to be blasted out with high explosives to make the 72-foot deep foundation for the New York Life Insurance Building. Four stories of this great skyscraper will be below street level. More than 150,000 cubic yards of earth and stone had to be removed.

For this huge blasting job George G. Atwell Company, Inc., used du Pont explosives exclusively—mostly 40 per cent gelatin dynamite. All shots were fired with electric blasting caps.

This enormous amount of blasting was done in strict accordance with all the numerous municipal regulations and requirements for the safeguarding of the public. The location is one of the busiest, most thickly built-up sections of New York.

There is no substitute, no just as good product as a du Pont explosive or as du Pont service.

**How the Work was done**

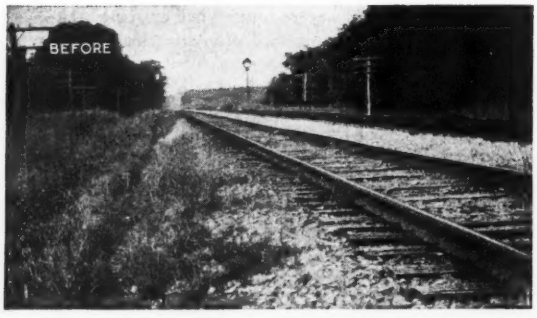
AFTER the surface of the hard gneiss rock was uncovered, more than forty portable pneumatic drills were set to work drilling thousands of holes two inches in diameter, and about twelve feet deep. The hard rock dulled the six-point drill bits so rapidly that six men and two sharpening machines were busy dressing six tons of drills daily. Then du Pont dynamite shattered the rock sufficiently to enable most of the pieces to be handled by the steam shovels, although some of them had to be drilled and blasted again. The holes were blasted in groups at morning, noon and night. Most of the explosive was 40 per cent gelatin dynamite. All shots were fired with electric blasting caps.

E. I. DU PONT DE NEMOURS & CO., INC.
*Explosives Department*
WILMINGTON DELAWARE

DU PONT

AN INVESTMENT IN PERMANENT SATISFACTION

# Casey Jones REG U.S. PAT OFF 580 BALLAST DISCER



BALLAST AGITATION AND DRAINAGE—SHAPING THE SHOULDER TO GIVE DESIRED CONTOUR—ESTABLISHING A PERFECT GRASS LINE—OPERATES IN ALL KINDS OF BALLAST—IMPROVES THE GENERAL APPEARANCE AND GENERAL CONDITION OF THE RIGHT OF WAY—SMALL INVESTMENT AND LOW COST OF OPERATION PER MILE—STANDARD FORD MOTOR AND SERVICE—AN ALL-PURPOSE HEAVY DUTY MOTOR CAR.

**NORTHWESTERN MOTOR COMPANY,**
**Eau Claire, Wis., U. S. A.**

# Announcing the Parsons No. 5 Crane

*(Capacity 5000 pounds)*

A big brother to the Parsons No. 3 CRANE which is already helping many roads to reduce the cost of laying rail and handling material.

HERE'S a new machine that will do its full share in cutting maintenance-of-way costs during 1927.

In design, it is similar to the Parsons No. 3 Crane, with worm and gear control of the power swing, and with extension-boom to give added range. Because of its heavier construction, the No. 5 Crane takes loads up to 5,000 pounds.

The Parsons No. 5 Crane provides an economical means of handling rail ties, bridge timbers, and double crossings. In addition, it can be equipped with compressor for pneumatic tools, with generator and magnet for handling scrap, and with extra drum for operating a double line clam shell.

Many railroad men have found that, compared with any other machines capable of doing similar work, Parsons Cranes are lower in price, and lower in operating cost. Get the facts yourself. Write for a free copy of our new illustrated booklet, "The Modern Way to Handle Rail".

*Manufactured by*

THE PARSONS COMPANY
Newton, Iowa

*Sales Representatives*

FAIRMONT RAILWAY MOTORS, INC., Fairmont, Minn.

*District Sales Offices*

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO
WASHINGTON, D. C. NEW ORLEANS WINNIPEG, CANADA

BALDWIN LOCOMOTIVE WORKS, Foreign Representatives

**PARSONS CRANE**

# MEETING THE DEMANDS

EAST ST. LOUIS, ILLINOIS—1879
HILLBURN, NEW YORK—1881
CHICAGO, ILLINOIS—1883
NIAGARA FALLS, NEW YORK—1903
NIAGARA FALLS, CANADA—1906
PUEBLO, COLORADO—1914
SUPERIOR, WISCONSIN—1916

## AND NOW

# LOS ANGELES

In our long years of experience (since 1879) it has been our aim always to anticipate every demand railroad development has required in refinement of design and accuracy of construction. RACOR products have a reputation, from Coast to Coast, for quality, performance and tested values that to many railroads mean safety, longer life and lowered maintenance cost.

The locations of the eight works of the Ramapo Ajax Corporation have been selected to supply local service at most of the larger railroad centers. This chain of works is the greatest organization in the world devoted exclusively to the production of switches, frogs, crossings, switch stands, etc., for steam railroads.

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*Sales Offices at*
**30 CHURCH ST. NewYork**
*and at*
**RAMAPO-AJAX-ELLIOT WORKS**

Hillburn, NewYork
Niagara Falls, NewYork
Chicago, Illinois
East St. Louis, Ill.
Pueblo, Colorado
Superior, Wisconsin
Los Angeles, Cal.
Niagara Falls, Canada

# RAMAPO AJAX CORPORATION

# AMERICAN
AURORA, ILL.

## *The "American" Trade Mark is Your Safe-Guard!*

For over fifty years the "American" trade mark on pumps and pumping machinery has stood for efficient performance — husky construction and guaranteed operation. Demanding this trade mark on your pumps is the simplest way of assuring yourself of standard pumping equipment.

THE AMERICAN WELL WORKS

*General Office and Works:* Aurora, Illinois

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Room 523—165 Broadway

DALLAS, TEXAS
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SAN FRANCISCO, CALIF.
635 Mission St.

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520 E. Third St.

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| | Birmingham, Ala. | Roswell, N. M. | |

# AMERICAN
AURORA, ILL.

## *The "American" Non-Clogging Centrifugal Pump!*

Here's a pump that is designed to handle fluids containing industrial and municipal refuse and sewage.

The design of this pump marks a new departure in construction and obviates the necessity of screens and their expensive maintenance!

The single blade impeller in the pump is so designed that the stream lines are not separated, but so the stream of fluid is kept in one mass and carried through the pump without being subdivided. By compelling all the liquid and debris to be discharged through a single peripheral passage, there is avoided the possibility of different portions of a single piece of debris being swept into different outlet passages and thereby being hung up within the impeller. This precludes screening sewage or fluid containing other material before pumping.

This pump is made in both vertical and horizontal types. Engineering information may be obtained from the engineering department of this company.

# Pneumatic Tamping

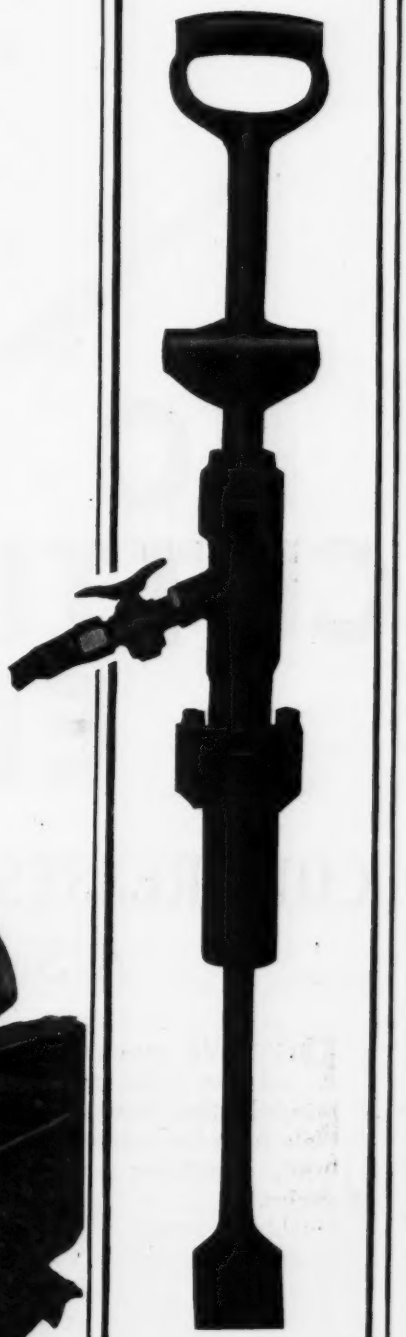
## *Costs less and lasts longer than hand tamping.*

Pneumatic tamping puts the track in better line and surface in the beginning, and the track remains in good condition twice as long as that tamped by hand.

Pneumatic tamping saves labor. Four men with air tampers do more work than twelve to sixteen men using hand picks and bars.

Accurate cost records from many roads show how these savings are made possible by Ingersoll-Rand Pneumatic Tamping Outfits. Ask for complete information.

INGERSOLL-RAND COMPANY — 11 BROADWAY, NEW YORK CITY
*Offices in principal cities the world over*
FOR CANADA, REFER CANADIAN INGERSOL-RAND CO., 260 ST. JAMES STREET, MONTREAL, QUEBEC



# Ingersoll-Rand

# NO CUTTING EDGES

## COMPRESSES WITHOUT DESTROYING
### A Single Fibre of the Tie

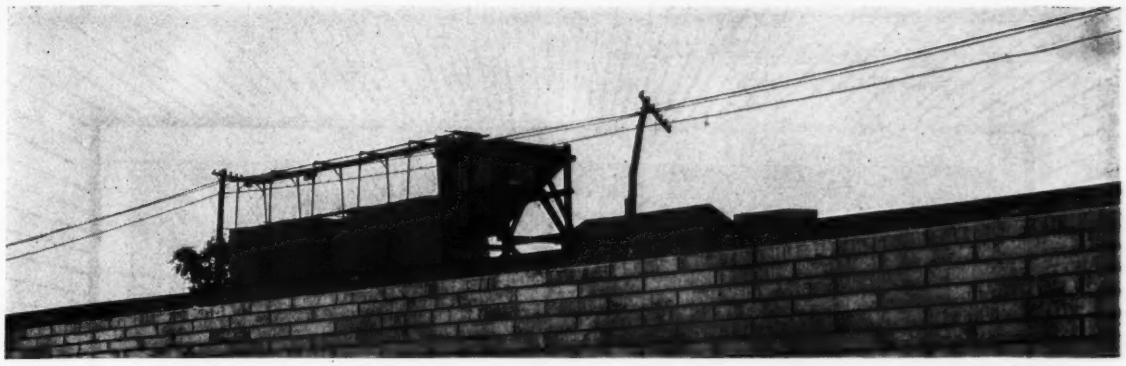
POSITIVE assurance against mechanical wear is the essential and scientific principle that removes the Lundie Tie Plate from the ordinary tie plate class and firmly establishes it as a truly economic device.

Unable by reason of this scientific design to cut a single fibre of the tie while holding track to rigid gauge, it guarantees a full 100% return on your cross tie investment. This tremendous yearly saving on cross ties is the most convincing argument for the Lundie Tie Plate because in every case it is backed by indisputable evidence of greatly extended tie life under the most severe operating conditions.

THERE IS NO SUBSTITUTE FOR LUNDIE

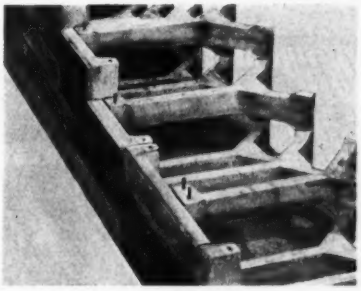
The Lundie Engineering Corporation
285 Madison Avenue, New York
166 West Jackson Boulevard, Chicago

# LUNDIE TIE PLATE



# Leading Railroads Adopt This Retaining Wall

Many of America's leading railroads are adopting Federal Concrete Cribbing Units for track elevations and depressions. They are easily and quickly installed, possess maximum strength and durability, and have all the fine appearance of good masonry. They meet every requirement of permanent construction, yet are economical in first cost and can be easily relocated if necessary with practically 100 per cent salvage.



Only Two Units Required

Federal Concrete Cribbing has only two units. The Stretchers, or face members, interlock with the Y-shaped members, forming a cellular wall without a third member in the bank. A one-inch continuous slot assures free drainage with no possibility of backfilled material filtering through.

*For further information write to*

**FEDERAL CEMENT TILE COMPANY**
**608 South Dearborn St., Chicago**

# FEDERAL CONCRETE CRIBBING

# Only the SYNTRON TIE TAMPER has ALL these advantages!

**The Syntron Tie Tamper is remarkable for its simplicity. Having only one moving part, it has nothing to get out of order, nothing complicated, and requires no skill to operate. It tamps ballast at the rate of 1500 blows a minute and enables one man to do the work of three pick tampers.**

## TWELVE EXCLUSIVE ADVANTAGES

1. Portability of power plant, which weighs only about one-fifth as much as compressed air outfit.
2. Can be transported along rail on dolly wheels. No air hose, pipe lines, valves and other fittings to handle.
3. Ultimate cost lower than other types of tampers.
4. Low maintenance cost, because of simplicity of construction.
5. Low operating cost—about 1½ H.P. per tamper. Power unit runs 8 hours on 5 gallons of gas.
6. No trouble from condensation or freezing in winter.
7. No variation in power and number of strokes. SYNTRON strikes a blow for each cycle delivered by generator.
8. No danger from high air pressure. No danger from shocks as Syntron power unit is of low voltage and operates on a non-grounded system.
9. Handle so shaped that worker can "take the weight in his lap" and work in erect position.
10. Can be successfully used by any laborer.
11. Light-weight engine makes starting easy.
12. Electric tools of all kinds can be operated from portable power unit.

*Let us demonstrate the many merits of the Syntron Tie Tamper.*

**The Syntron Company**
**Pittsburgh, Pa.**

# For Heavy Duty

Figure 105 complete with heavy duty equipment. Air capacity sufficient to operate three units or one rotary wire brush.

## Due to Its Rugged Construction, This Equipment Is Particularly Adapted to Railroad Maintenance Painting Work

The 105 Matthews Mechanical Painting Equipment is made for heavy duty. It is built to stand the wear and tear of constant service. Its compact, sturdy design makes it ideal for mounting on motor cars or trailers. Tests demonstrate its ability to render remarkable saving in painting costs.

### 40% Saving Demonstrated

Take the experience of the B. & O. On their Baltimore Division, two 105's were placed in service as a test. Twelve months later a check was taken. A saving of approximately 40% was shown. Fifteen Division Points are now equipped with the 105 Matthews Mechanical Painting Equipment illustrated above. Numerous other railroads are adopting this equipment.

### Thoroughly Dependable

Each part of a Matthews Equipment has been made standard only after thoroughly demonstrating its ability to function properly in relation to the other parts of the unit. From the guns down to the engine that drives the compressor, Matthews Equipments have proven time and again that they can be depended upon to furnish a constant air pressure up to 125 lbs. absolutely free from oil or moisture in the air line, on every type of the most difficult maintenance work.

### The Matthews Gun

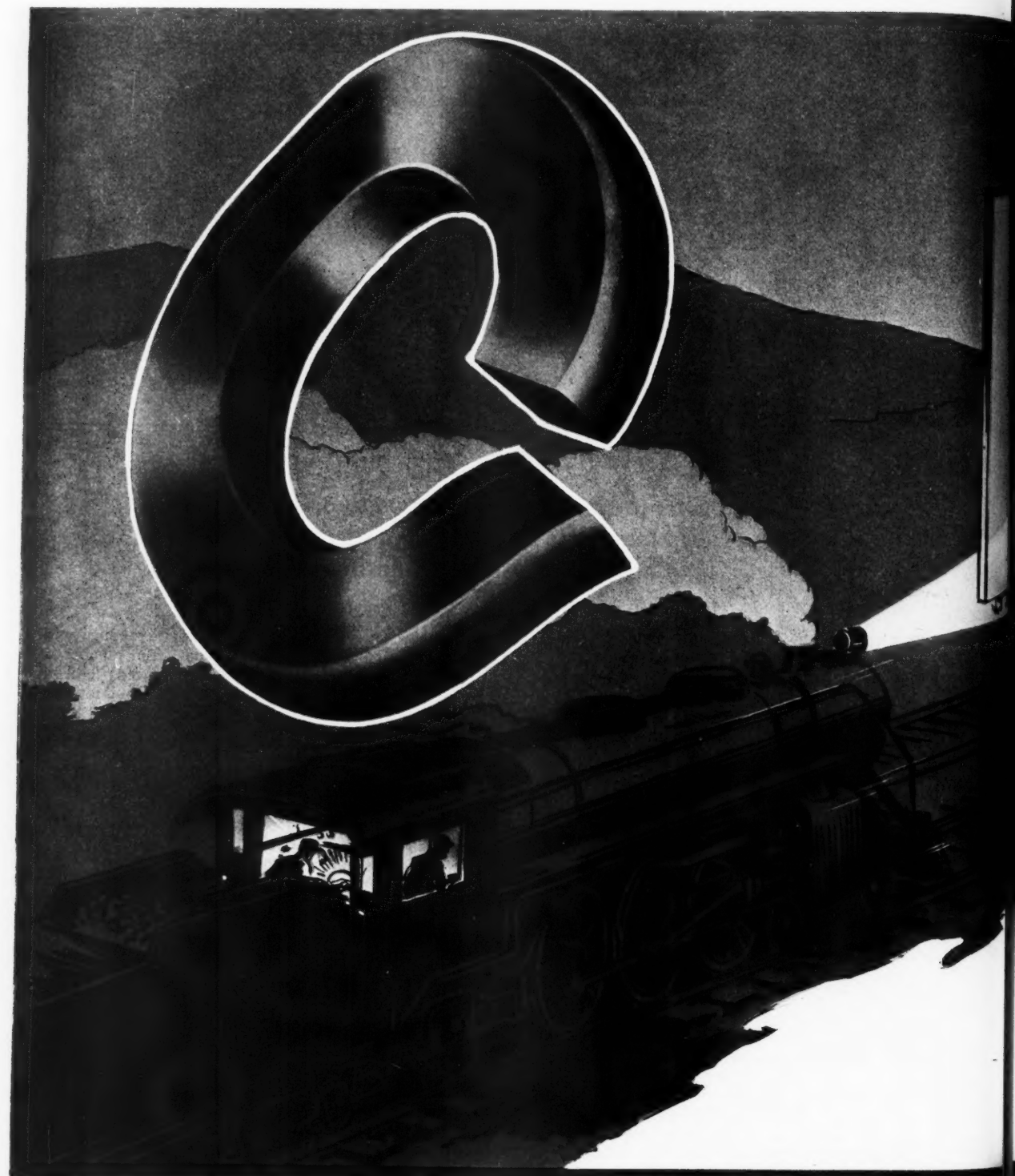
Of particular importance is the Matthews Gun, upon which, more than anything else, the successful operation of the complete equipment depends. A truly remarkable gun—different from all others, and thoroughly protected with patents. It permits the use of practically any material than can be applied with a brush. On some work it reduces the number of coats required. It is perfectly balanced, light in weight, and has a comfortable pistol grip, and is therefore preferred by workmen wherever used. Easily cleaned, quickly adjustable from a spot the size of a dime to a full 12″ fan stroke.

### Get This Interesting Booklet

"Mechanical Painting For Maintenance" is a 12-page booklet that will answer many of the questions you want to ask about your painting problems. Gives comparative costs on brick, corrugated iron, stucco, weatherboard, shingle roofs, tanks and all kinds of interior surfaces. Contains full information regarding the different kinds of material handled and how to select them. Shows photographs of different equipments and close-ups of various units and their make-up. Gives extracts from fourteen letters received from prominent manufacturers regarding their experiences. Has a page of questions and answers. Tells about the instruction given your men and the service you can expect. Send for this booklet today.

W. N. MATTHEWS CORPORATION
3770 Forest Park Blvd. St. Louis, Mo.

**MATTHEWS**
***MECHANICAL PAINTING***
**EQUIPMENT**



# IMPROVED

## ECONOMY IN MAINTENANCE

IMPROVED HIPOWER assures a high standard of maintenance at a low cost. It cannot be flattened by ordinary wrenching and, therefore, provides an active spring member which absorbs shocks and retards and compensates for frictional wear as it occurs.

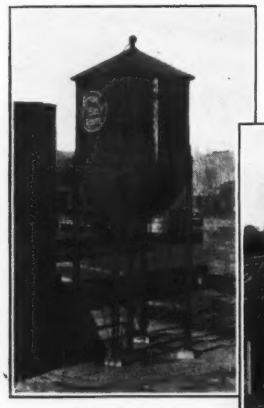
The enormous pressure forces the joint bars tightly against the rail at all times. This continuous tightness assures top notch economy and efficient maintenance. It protects against loose joints which are so susceptible to irreparable damage, such as battered rail ends, broken bolts and broken joint bars.

IMPROVED HIPOWER cannot rust because it is *Parkerized.* It costs less per 1000 pounds pressure.

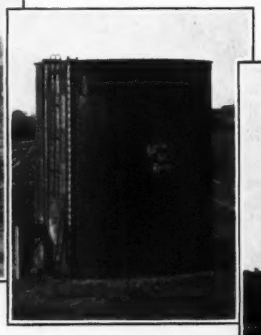
**THE NATIONAL LOCK WASHER CO.**
**Newark, N. J., U. S. A.**

# HIPOWER

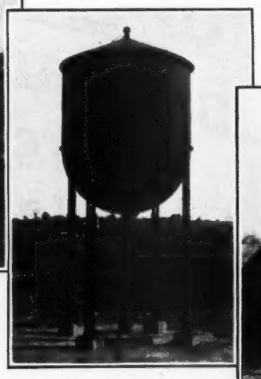
# On the St. Louis Southwestern Railroad



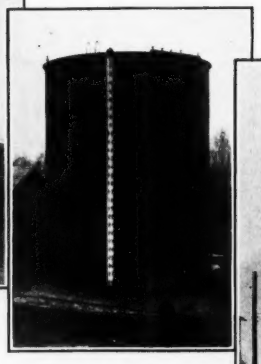
Pine Bluff, Ark.
Water Tank



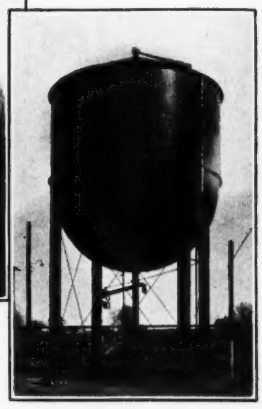
Commerce, Tex.
Water Tank



Hamilton, Tex.
Oil Tank



Shreveport, La.
Water Tank



Mt. Pleasant, Tex.
Oil Tank

THESE are a few of the Pittsburgh-Des Moines steel tanks in service on the St. Louis Southwestern lines. The elevated tanks store oil or water; the flat-bottom tanks are settling tanks, and also furnish clear water storage for roadside delivery.

Pittsburgh-Des Moines elevated tanks and standpipes are in service on the leading roads throughout the country. They are available in many capacities and heights to meet any requirements. Pittsburgh-Des Moines standard designs are carried in stock, completely fabricated and ready for shipment. Special designs will be promptly built to meet any conditions.

We also offer you a complete general contracting service, backed by thirty years of experience, on any work involving water supply, treating or storage. Submit your plans to the nearest Pittsburgh-Des Moines office for estimates. Or ask an engineer to call and discuss your work with you.

PITTSBURGH TANKS DES MOINES

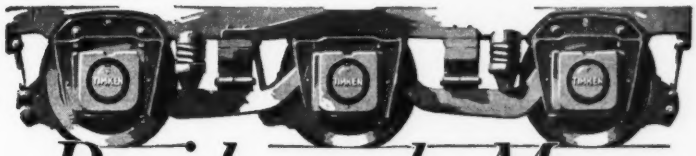
Pittsburgh
Des Moines
New York
Atlanta
Chicago
Dallas
Seattle
San Francisco

*Write for our new Railway Catalog No. 72*

**Pittsburgh-Des Moines Steel Company**

**674 Professional Bldg., Pittsburgh, Pa.** **976 Tuttle St., Des Moines, Ia.**

PITTSBURGH DES MOINES



*Railroad Men:*

# Permanently Trouble-free Car Journals

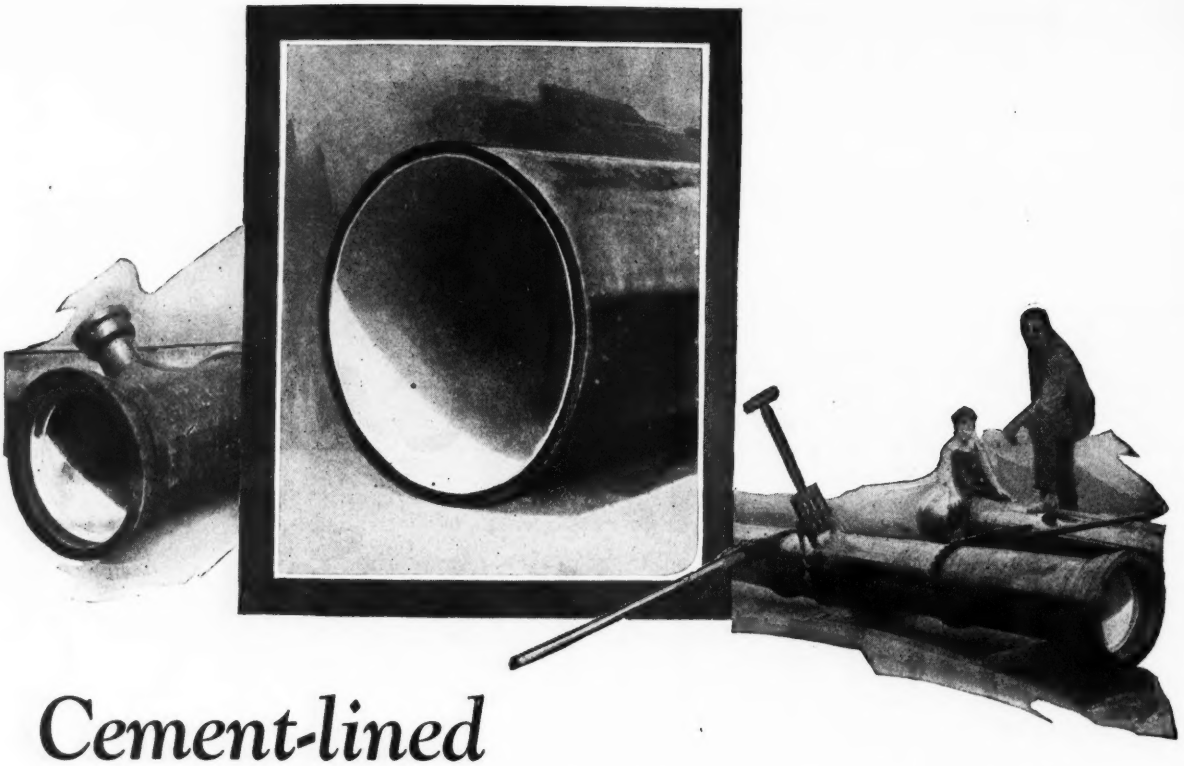
A mere *one-eighth* of the power formerly needed now smoothly starts the Chicago, Milwaukee & St. Paul's crack flyers. Timken Tapered Roller Bearings free THE OLYMPIAN and THE PIONEER LIMITED from all possible friction. Yet that only begins the great economies and operating betterments made possible by Timken Bearings in railroad cars.

Timkens are *more* than anti-friction bearings. Their use results in journals that are enduringly trouble-free. Their positively aligned rolls, tapered construction, and Timken-made electric steel permanently withstand all shock, side-thrust, weight, and speed.

Eliminating wear, hot-boxes, and by far the greater part of previous lubrication costs, Timken Bearings loom as the greatest possibility today in railroad economics. Timken advantages are shared by the public as well, in the form of jerkless starting, increased riding comfort, and more restful night travel. Full data and any desired engineering counsel are at the disposal of every railroad, upon request.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

**TIMKEN** *Tapered Roller* **BEARINGS**

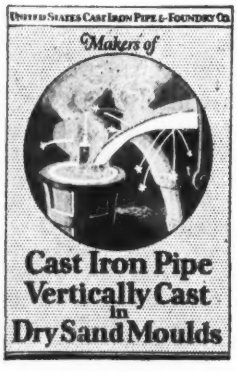


# *Cement-lined* deLavaud Cast Iron Pipe

THE cement lining, when applied by the centrifugal method, is extremely dense and has a porcelain-like surface.

The lining adheres to the iron so tenaciously that the pipe can be cut or tapped without breaking the coating adjacent to the cut.

Moreover deLavaud centrifugal pipe, with its larger internal diameter, cement-lined by this method, has initially as great carrying capacity as ordinary pipe, nor is the flow reduced with age.




*If you have any problem that involves the necessity of an absolutely non-corrosive pipe under all conditions, write to us for special literature covering the specifications, manufacture and uses of deLavaud centrifugal cement-lined cast iron pipe.*

*Write for details of the service we maintain for the assistance of Construction Engineers*

## United States Cast Iron Pipe and Foundry Company

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**Burlington, New Jersey**

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*Chicago:* 122 So. Michigan Blvd.
*Birmingham:* 1st Ave. & 20th St.
*Buffalo:* 957 East Ferry Street
*Cleveland:* 1150 East 26th Street
*New York:* 71 Broadway
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# Stop! wasting money on RAIL ROAD CROSSING INGS

BITUROC Crossing, Fortville, Ind.

## Construct Them With

BITUROC
TRADE - MARK

## Natural Kentucky Rock Asphalt

BITUROC Crossing, Cincinnati, O.

Bituroc is a natural bituminous sandstone quarried and pulverized at our plant at Summit, Hardin County, Kentucky.

During the past two or three years there has been an enormous increase in the use of this product by Railroads for railroad crossings and station platforms and other uses. Great satisfaction has been obtained by every railroad that has used the product. Enormous saving in up-keep has resulted—ultimate cost being greatly reduced.

The material is shipped in open top coal cars ready to lay COLD. Any section crew with ordinary tools can do the work. If rollers are available, we recommend them. If not, it can be satisfactorily hand tamped.

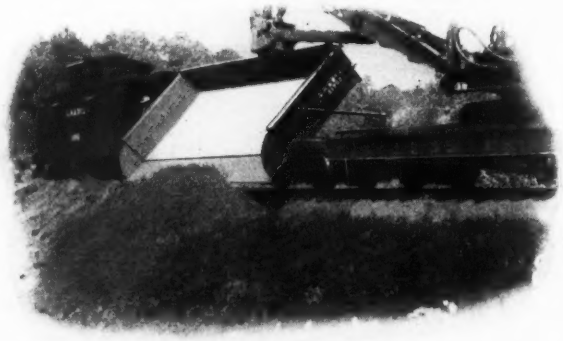
Bituroc, due to its elasticity and resiliency, will withstand the vibration and impact of combined vehicular and rail traffic, where a more rigid type of pavement will crack and disintegrate under the strain.

*WRITE FOR SPECIFICATIONS*

## Ohio Valley Rock Asphalt Company

Incorporated

Starks Building Louisville, Ky.



# NOW

## You Can Operate Dump Cars with Safety

# DIFFERENTIAL AIR DUMP CARS

THE DOUBLE FULCRUM PRINCIPLE ALLOWS THE BODY TO REST ON FOUR POINTS DIRECTLY OVER THE BOLSTER SIDE BEARINGS

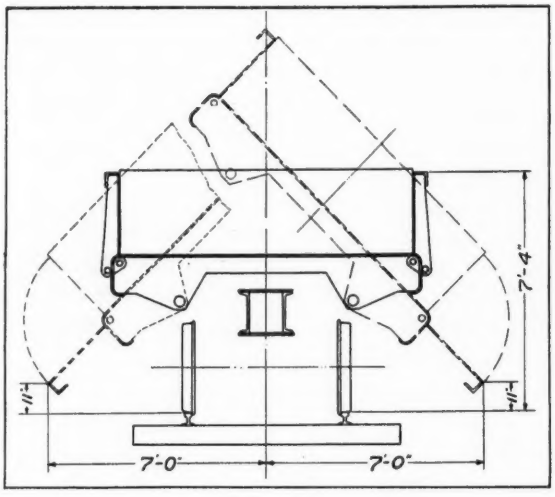
Eliminates locking mechanism.
Absolutely no chance for accidental dumping.
Dumps quickly and positively.
Dumps without destructive shock.
Car is as stable as a gondola.
No tendency for car to overturn during dumping operation.

Low height—easy to load with ditcher or steam shovel. Stability in transit—no delays—no accidents. Dumps further from track—keeps the ballast clean—saves labor. Down-folding door—no obstruction to discharge of load.

All steel—rugged construction—doors reinforced and extremely rugged. Floor supported by lateral beams at short intervals. Constructed to give longest life and minimum maintenance.

### The Differential Car

has become synonymous with safety. In addition, its superior performance and its excellent construction make it a money-saver in three departments.




### The Differential Car

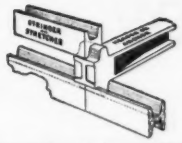
is the most notable achievement in dump car design for many years. It combines excellence in every operating phase — and it eliminates the locking mechanism!

Patented

## THE DIFFERENTIAL STEEL CAR CO.

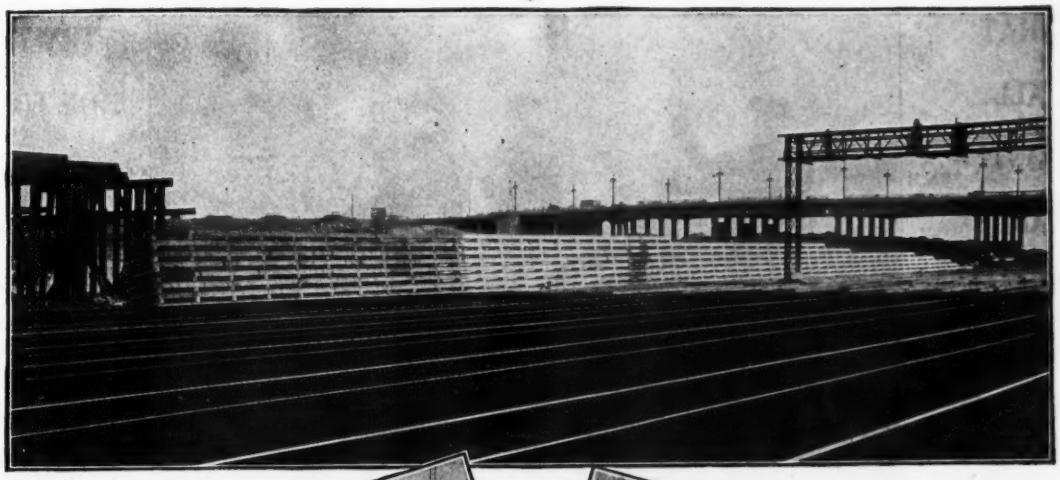
FINDLAY, OHIO

# R. C. RETAINING WALL UNITS

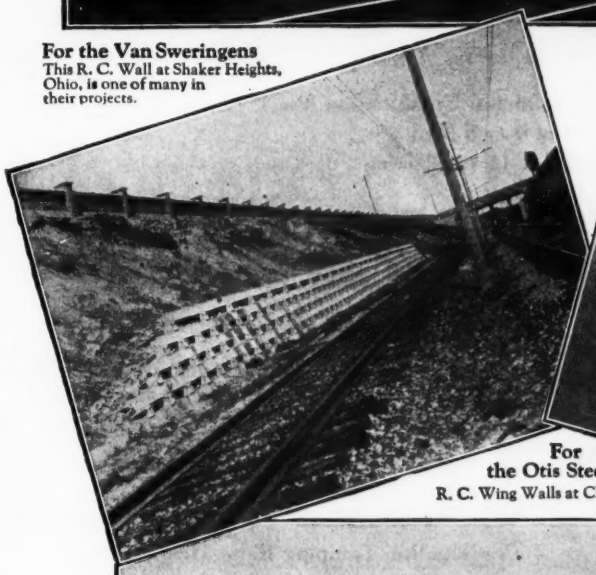


## Usually Cut the Costs Over 50%

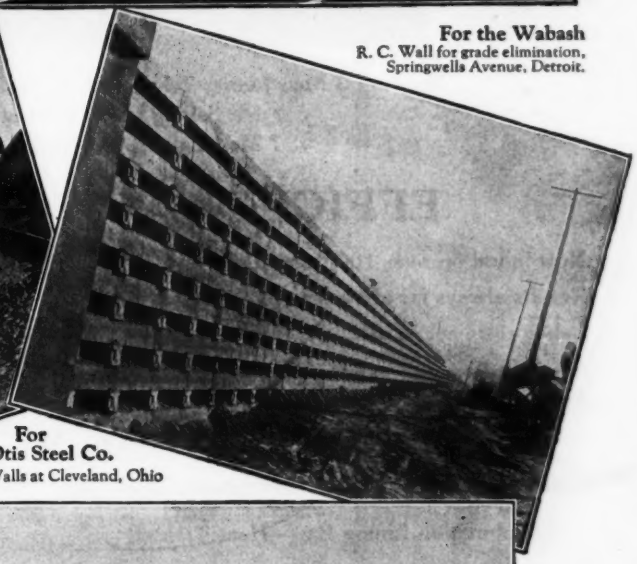
Because in building an R. C. Wall, such as that for the Illinois Central, shown below—no skilled labor, mason work or massive foundations are required.



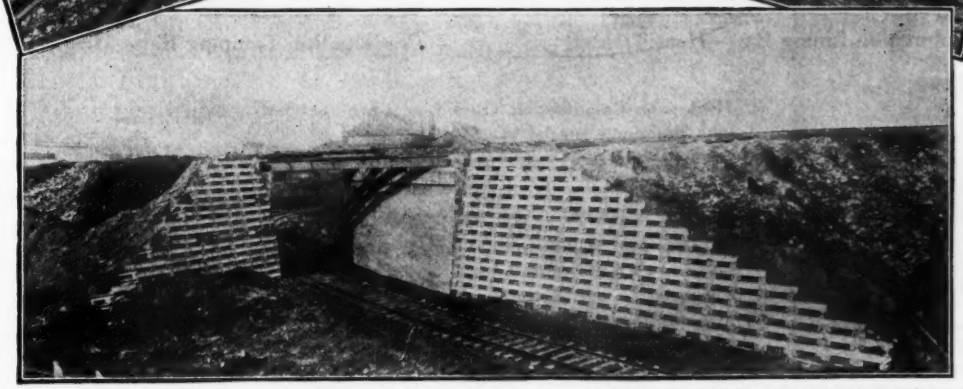
**For the Van Sweringens**
This R. C. Wall at Shaker Heights, Ohio, is one of many in their projects.



**For the Wabash**
R. C. Wall for grade elimination, Springwells Avenue, Detroit.



**For the Otis Steel Co.**
R. C. Wing Walls at Cleveland, Ohio



***Send for this Free Book*** The R. C. Book contains illustrations of many typical installations—shows wall details and gives standard specifications. Also other useful information. Write or send the coupon for a copy—for present use or for your files.

**THE R. C. PRODUCTS COMPANY, Inc.**
ENGINEERS BUILDING, CLEVELAND, OHIO
New York Chicago Norfolk Pittsburgh San Francisco
St. Louis Buffalo

REG. U.S. PAT. OFF.
**PRODUCTS**
PRECAST RETAINING WALL UNITS

**The R. C. Products Co., Inc.**
Engineers Bldg., Cleveland, Ohio
Send me your *free* book of Retaining Wall Data ☐
Also complete information on the use of R. C.
Units for the following purposes_____

*Company Name*_____
*Individual's Name*_____
*Address*_____

# SAVE 60% OF LABOR AND TOOL COSTS

WHAT ALL MAINTE-NANCE OFFICIALS WANT

TRY THEM ON TOUGH JOBS— THEY ALWAYS MAKE GOOD

**Showing 3 Men Lining Track with 3 Hackmann Combination Track Liners**
**Saving Labor Cost of 4 or 5 Men**
**7 Men Can Do the Work of 15 or 20 Men**

## EFFICIENCY WITH ECONOMY

Now in use on over 100 railroads.

Results always far above expectations.

Labor costs cut in half.

Small and easy to handle. Weight only 20 lbs. Made of steel.

Lines track, frogs and switches.

Raises low joints and spaces ties.

Smooths rough track without disturbing road bed. Can be operated against the end of switch ties.

**HACKMANN TRACK LINERS HAVE ALL THE ABOVE STERLING QUALITIES**

**Combination Lining Bar—Heat Treated**

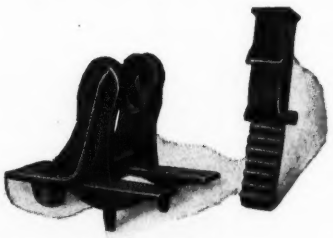
**Combination Tamping Bar—Heat Treated**

Hackmann Combination Track Liner

Hackmann Combination Track Liners are operated with the above special bar.

Hackmann Duplex Track Liners are operated with ordinary lining bar. Removable Fulcrum.

Note the Two Step Feature at top of base. You can make at least two pulls without resetting the liner. They can be left in track, allowing trains to pass over without any danger.



Hackmann Duplex Track Liner

WRITE FOR ILLUSTRATED AND DESCRIPTIVE LITERATURE

## THE HACKMANN RAILWAY SUPPLY CO.

J. J. FRANZEN, *Secretary and Treasurer*

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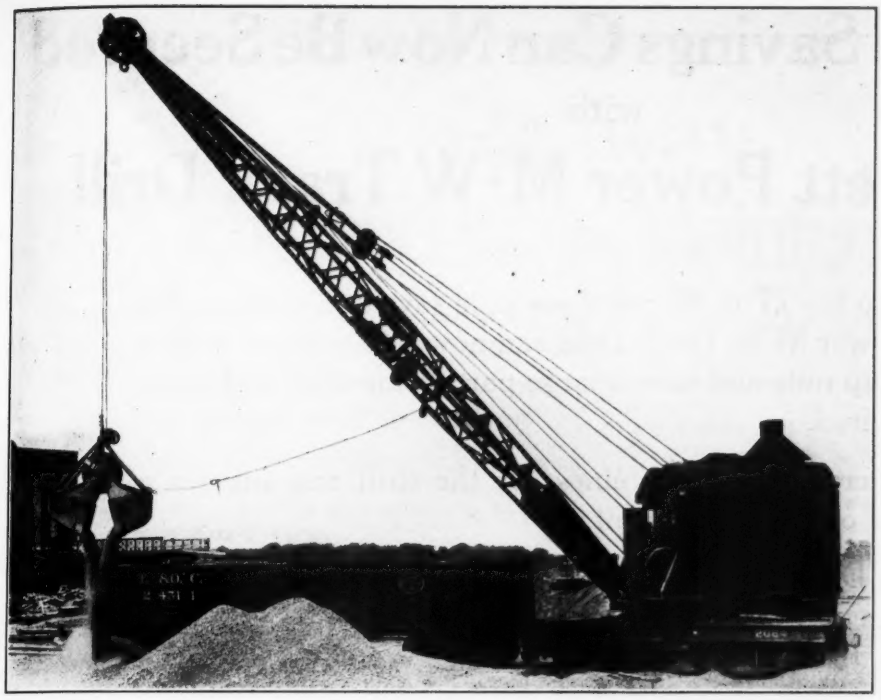

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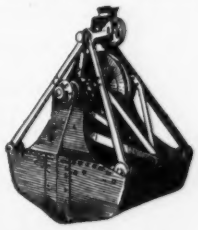
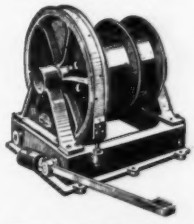


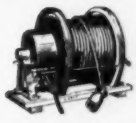
Clam Shell Buckets

Orange Peel Buckets

Drag Scraper Buckets



Counterweight Drums



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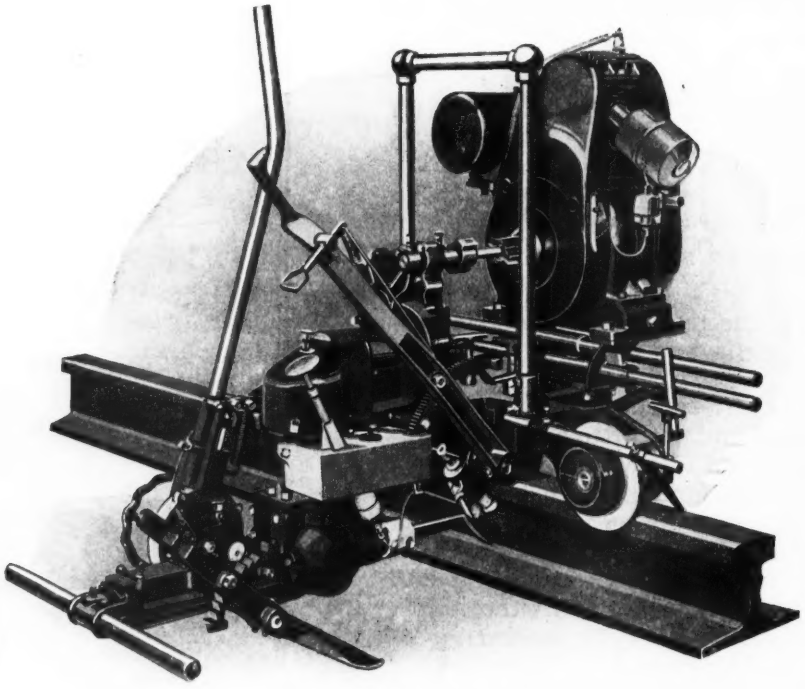

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It will drill up to 1½" holes through web of rails any size from 65 to 150 lbs.

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# Railway Engineering and Maintenance

Volume 23 May, 1927 Number 5


## MAINTENANCE MEN IN FLOODS

THE unusually serious floods, which have been prevalent over large areas in the Mississippi valley during the last month and which are now coming to a crest along the lower river bring into bold relief the importance of the work of the maintenance of way department in the operation of a railway, for it is these forces more than those of any other branch of railway service which have fought and are still fighting the floods day or night without regard to hours or to personal comfort in order that transportation may be maintained with as little interruption as possible. Such crises as these serve to bring out more prominently the character of the responsibility carried by the forces of this department from day to day in all kinds of weather and during all 24 hours, 365 days of the year. It is to the credit of these men that when the need arises they are not found wanting.

Supervisory officers throughout the country can do much to build up an esprit de corps among their maintenance of way employees by calling their attention to the character of the service that is now being rendered by men in similar positions in the flooded areas. By impressing them with the importance of the service rendered by these men, they have an opportunity to stimulate a feeling of pride among their men in the work of their associates in the inundated territory.

It is through such measures that the morale of an organization may be built up and the efficiency of its operations increased. That road will be maintained most efficiently whose employees believe that their railway is the best railway in the United States and their department the best department on that railway.

## A MOTOR CAR IS A DANGEROUS WEAPON

IN the control of a careless person, a track motor car is a dangerous tool—to the operator himself and those riding with him, as well as to those with whom the car may come in contact on the track. This is shown by the fact that 35 employees were killed and 125 injured in motor car accidents in 1925, according to the records of the Interstate Commerce Commission which are abstracted on page 207.

The motor car has come to be standard equipment for maintenance gangs on most roads. Its economy is no longer questioned. In many places it is essential with the present methods of handling work. The most serious objection that is raised to it is the hazard of its operation, in support of which the accident record noted above is offered.

This record is sufficiently serious to cause concern. Investigation will show that the difficulty is not confined to any one section of the country or groups of roads, but is widespread. However, a closer analysis will show a wide divergence between the records of neighboring roads, which leads to the inevitable conclusion that these accidents are in better control on some roads than on others. It is worth while to examine the practices on the roads with the relatively greater freedom from serious accidents to ascertain the cause.

Such an investigation will almost invariably show a marked contrast in the attitude of supervisory officers towards these accidents. On some roads they are regarded as more or less a matter of course and little thought is given them if they do not become unduly numerous. On other roads, however, every accident is considered a cause for concern and is investigated carefully to determine the cause, preliminary to fixing responsibility and apply disciplinary measures where warranted. Where the latter measures are in force, it will be found that cars are operated more carefully and accidents fewer. In general, it will be found that the number of serious accidents of this character is a reflection of the importance attached to this subject by supervisory officers.

In addition to the enforcement of disciplinary measures publicity is a big help in the promotion of safe practices. If every accident is investigated and the cause determined and this information then spread broadcast among others similarly employed, it will do much to impress upon these employees the danger of the practices which contributed to the accident in question and cause them to avoid these practices in the operation of their cars.

## A NATIONAL SERVICE

"THE work of our railway managers and the results of your (shipper's) co-operation have brought about an industrial accomplishment such as I do not believe we have ever seen in our country in so short a period of time. The railways came out from the war thoroughly demoralized and in so short a time as five years, we find the country equipped perhaps for the first time with completely adequate transportation. The railway managers have not alone provided a sufficiency of transportation and have, therefore, cured a thousand ills in the business world, but they have shown an extraordinary capacity in the improvement of the efficiency of our railroads. They have increased the traffic which they handled at the time the railways came out from government operation by something over 20 per cent and they are handling it with 200,000 less employees. One of the reasons for the abundant capital in our country today has been the numerous decreases in inventories in lumber, in dry goods and in every commodity in the country because of the complete confidence of business and industry that they can receive supplies on demand. One of the reasons for the stability in our

price levels has been the fact that goods move quickly."

In these pointed statements to a gathering of shippers and railway officers at a meeting of the Atlantic States Shippers' Advisory Board at Washington, D. C., on April 5, Herbert Hoover, secretary of commerce, showed the striking improvement in railroad service effected within the last five or six years and the far reaching contribution it has made to our national prosperity. This has been made possible by increased efficiency in every department—as much in the maintenance of way department as elsewhere—and the tribute that he paid to "railway managers" is a tribute to every employee for whom the railway managers are spokesmen.

Greater regularity in train movement has been made possible by better maintenance in its many details. More economical service has been made possible by heavier trains and they in turn by better track and stronger bridges.

To do good work is pleasing to every conscientious employee. To receive public recognition and appreciation of this work from as well informed a person and one holding as important a position in public life as Herbert Hoover is particularly gratifying.

Great as is the progress that has already been made, maintenance men know only too well that still further improvement can be made. A knowledge of the value of their service to the welfare of the country as a whole should stimulate maintenance employees to effect these further improvements.

## KEEP YARDS AND TRACKS CLEAN

THE importance of keeping the roadway and yards free from rubbish or other loose material is emphasized by statistics in Accident Bulletin No. 94, covering railway accidents during 1925, which has been issued by the Interstate Commerce Commission and from which certain statistics have been abstracted on page 207 of this issue. In many of the accidents reported the responsibility of the maintenance of way department looms large, but nowhere, perhaps does it stand out more strongly than in the accidents caused by tripping over rubbish or other loose material, falling into holes, or slipping on defective station platforms. The records show that 3 deaths and 2,730 reportable injuries were caused by persons, principally employees on duty, tripping over loose material, while 10 others were injured by slipping on defective station platforms.

The cleaning up of yards and the roadway adjacent to the tracks is often neglected on the grounds that it is only a matter of looks and that money spent for this purpose lessens the amounts that might be spent for other more necessary work. This argument is sound when it is based on facts, but in many cases the work would be justified even if the question of accidents were not involved. Once a yard or section of track is cleaned up it can be kept clean at a surprisingly small cost if systematic plans are made to pick up loose material as it appears, while the value of the scrap material thus recovered is no small matter in the aggregate. A section gang going over the road on a motor car or a yard gang working with a push car on a yard track, can pick up a surprisingly large amount of material with no great loss of time and the efforts may avert some needless accident.

The amount of work necessary to keep the tracks clean, especially in yards, depends to a large extent on the character of the traffic, and roads handling a considerable amount of coal have much trouble in this respect, but also have the advantage that the coal picked up has a real money value. Instances are plentiful where the coal salvaged from along the tracks is sufficient to furnish the fuel for pumping stations or other steam plants in the vicinity. Clean yards will also permit the speeding up of switching and while it would be difficult to place a monetary value on this feature it exists, nevertheless.

The cost to the railway companies of accidents of the type referred to will go far towards meeting the cost of getting rid of the rubbish and reducing the hazard of railway work in places where a sure footing is one of the best safeguards against mishap. To state it as a cold-blooded business proposition, the cost of 3 deaths and nearly 3,000 injuries will pay for picking up a lot of loose material and rubbish.

## HOW BRIDGE SPANS ARE RENEWED

INGENUITY in the erection of bridge spans has had much freer play in the railroad field than in that of the highways because it is only in rare cases that the railroads resort to the detour or shoofly so common when highway bridges are being renewed. Generally speaking, railroad bridge erection schemes are developed with the primary requirement that the work must be carried on with only occasional interruptions of the use of the bridge by trains. Consequently, bridge engineers have had to exercise the utmost ingenuity in meeting the obstacles which attend the replacement of an old span with a new one.

Notwithstanding this, a classification of the methods that have been used in bridge renewals shows that only a limited number of essentially different methods are commonly employed. The first classification concerns the method of supporting the new steel during erection. It embraces the use of falsework, the cantilever method, and, in rare cases, the support of new steel from the old. Girder spans are usually placed directly on the piers or on temporary bents immediately alongside. The second classification relates to the method of replacing the old structure with the new and embraces the piece-meal removal of old truss spans on falsework and the piece-meal erection of the new spans to replace them, the erection of new trusses around the old, the erection of deck girder spans inside of old through truss spans and the erection of new spans alongside the old to be followed later by a lateral replacement on rollers or, in the case of short spans, by lifting out the old spans and lifting in the new ones. In some cases spans have been replaced by floating both the new and old spans on barges and in extremely unusual instances by the use of barges combined with the longitudinal rolling of the spans on supports behind the abutments, whereby the old span has been rolled back on one approach while the new span is rolled and floated out from the opposite side. In a few cases also, spans have been rolled longitudinally on falsework to make room for a longer span or to set the superstructure on new piers. Special measures also are necessary in the case of drawspan renewals.

Where traffic interference is not severe and falsework is not prohibitive by reason of expense or hazard, truss spans are most readily replaced by piece-meal removal and erection since this method usually requires the smallest force and the simplest equipment. But with frequent train movements the delay to both traffic and erection operations often demands that the new spans be erected alongside the old in order that interference with traffic be restricted to the actual replacement of the old spans by the new by means of sidewise rolling. This method has the further advantage of increased safety because at no time is traffic carried on

falsework. However, it calls for a greater perfection of plans and as the time element involved is dependent in a large degree on the speed with which the jacking operations are conducted, the use of efficient and high-powered jacks is a primary requirement. This method has been used with such frequency in recent years that it is only the occasional job which introduces extraordinary features.

The same observation applies to other methods of erection. It is primarily in the evolution of details to meet special obstacles that there is any departure from ordinary practice. This is well illustrated in the article appearing in this issue in which girder spans were erected inside of old trusses, as has often been done before. This unique feature lies in the manner of maneuvering one of the girders into place to avoid the racking of the old trusses from which the girder was temporarily suspended. It is in devising such expedients rather than in the invention of distinctly new methods that the bridge man is meeting the exacting requirements of his work.

## RAIL PRODUCTION LARGE

THE fact that the production of steel rails exceeded 3,000,000 tons in 1926 for the first time since 1913 is a striking indication of the magnitude of the maintenance programs of the roads last year. To be more specific the tonnage rolled totaled 3,217,649 or 432,392 tons (nearly 16 per cent) more than in the preceding year. Furthermore, the tonnage of rails of 100-lb. section and heavier rolled last year was more than twice that of similar weights rolled in 1922 and nearly three times that rolled ten years ago.

This is a definite indication of the rapidity with which the railways are increasing the weight of the rails in their tracks and adding thereby to the strength of their track structure. It is also an indication of the willingness and ability of the roads to spend more money for rail as a means of effecting further economies in maintenance since the experience of those roads which have gone to heavier rails shows that the increased service secured from these newer sections is greater in proportion than the increase in the amount of metal. With more and better ballast, with treated ties, with a more universal adoption of tie plates, rail anchors and other track accessories, and with heavier rail and fastenings, the railways are making rapid progress in the development of a stronger and more permanent track structure which will not only yield better service but longer life and more economical maintenance as well.

## WHAT PRICE PERFORMANCE RECORD?

ONE argument which has been offered in justification for the contracting of maintenance of way operations, such as rail laying and ballasting is that it insures quality as well as quantity in return for the expenditure made, because of the fact that a properly drawn contract insures that the contractor will have ample incentive for a high rate of progress and that he, therefore, can be left entirely responsible for the progress made. This relieves the railway officer in large measure of responsibility for adequate output of work and he can therefore concentrate his attention on quality.

To contend that quality is easier of attainment on contract work is a new thought, for it has been almost invariably maintained in discussions of the relative merits of contract and company work, that quality is harder to obtain if the work is done by contract because the contractor's profit is necessarily determined by the rate of progress, and that he will, therefore, oppose efforts to require better work than he deems called for. We hold no brief for contracting of maintenance of way operations, but there are reasons to believe that rail laying and ballasting are frequently carried on by company forces under conditions which engender in the mind of the railway officer in charge the same attitude toward quantity and quality which is so often ascribed to the contractor. This attitude of mind is prompted by the pressure for performance in which competition between divisions or sub-divisions has been made to play a prominent part.

This does not imply that competition is in any way objectionable, for it is a legitimate means of spurring men to increase their efforts and has been an important factor in decreasing the cost of maintenance of way work. However, in developing the spirit of competition, steps must also be taken to insure that the quality of the work is not overlooked. This not only implies that some system of checks be instituted which will insure that the work is done properly but it is also necessary to give the question of quality a prominent part in announcing the results of performances by various gangs. Competition often results in intense rivalry which accrues to the interest of the railroad. It frequently keys men up to a point which gives rise to bitter disappointments and, at times, even suspicions of partiality. Therefore, in publishing the results of competitive performance records, it is of utmost importance to show that high performance was not obtained by a sacrifice of good workmanship.

# New Books

**Proceedings of the American Railway Bridge and Building Association.** 304 pages, illustrated, 6 in. x 9 in. Bound in cloth. Published by the association, C. A. Lichty, secretary, 319 North Waller avenue, Chicago.

This volume contains the report of the thirty-sixth annual convention which was held at Richmond, Va., on October 12-14. It includes reports of committees on Pumping Equipment for Various Kinds of Service, Protecting Structures Over Tracks from Locomotive Gases, the Use of Motor Cars by Bridge and Building Gangs, the Relative Merits of Various Kinds of Roofing Material for Different Kinds of Railroad Buildings, the Method of Repairing Disintegrated or Poor Concrete, the Use of Creosoted Timber, Including the Selection of Woods Best Adapted to Treatment, the Use of Compressed Air in Bridge and Building Work and the Application of Protective Coatings to Structural Steel. This volume also contains addresses on "The Organization of a Maintenance of Way Painting Force" by L. B. Allen, assistant to vice-president of operation, Chesapeake & Ohio; "Accidents to Maintenance of Way Employees" by Thomas H. Carrow, supervisor of safety, Pennsylvania Railroad, and chairman, Safety Section, American Railway Association; "Framing Bridge Timbers Before Treatment" by Earl Stimson, chief engineer, maintenance, Baltimore & Ohio; and "Some Comments Upon Our Public Relations" by W. D. Faucette, chief engineer, Seaboard Air Line Railway. These proceedings are edited to the high standard that has long characterized the publications of this association.

BETTER RECORDS IN ENGLAND.—The average tie renewals on four British systems ranged from 54 to 97 in 1926, compared with averages ranging from 67 to 130 on the same lines in 1927.

# Rail Wear Cut 80 Per Cent
## By Norfolk & Western Flange Oiler

### Experiments on Lines With Heavy Curvature Led to Development of Lubricating Machine Installed in Track

THE PROBLEM of rail wear on curves has been given much study on the Norfolk and Western with a resultant increase of about 400 per cent in the life of rails in these locations. While this problem has existed to a more or less extent at every curve, it has been particularly acute on the Radford division of the Norfolk and Western which crosses the Allegheny mountains between Roanoke and Bluefield, Va. Here, through a distance of 100 miles, the curvature ranges from 3 degrees to 12 degrees, and on the two mountain grades of this line where 65 per cent of the track is on curves, the curves vary from 6 degrees to 12 degrees. The maximum super-elevation on the curves is 5 in., and the maximum grades on the east-bound track, upon which an average of 70,000 tons is moved daily, are 1.3 per cent ascending and 1.6 per cent descending.

#### Rail Wear on Curves Was Severe

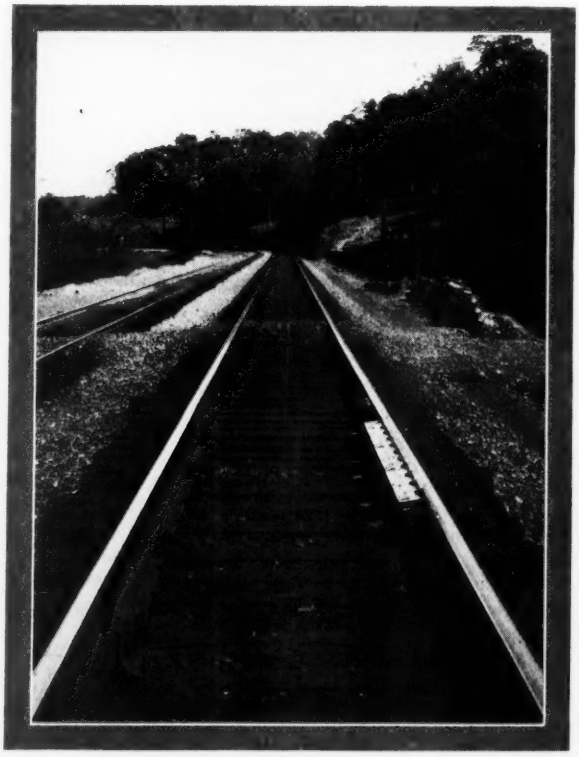
With these conditions prevailing, rail wear on the curves within this territory has been particularly severe. This is evidenced by the fact that the average life of 130-lb. rails on the high sides of 10 degrees to 12 degree curves has been only 2 to 3 years. On the low sides of curves the life of the rails has been usually about 50 per cent longer than on the high sides.

Confronted with this situation the Norfolk and Western began experimenting about two years ago with the application of oil to the inside of the heads of the rails on the high sides of curves. At first the oil was applied to the rails by section men with short stub paint brushes, at intervals of about 12 inches over a distance of from 10 to 12 rail lengths on two curves in opposite directions, care being taken to keep the oil from the tops of the heads where it would interfere with traction. With the rails so oiled, it was found that the oil was picked up by both right and left wheel flanges of passing trains and was distributed by them wherever the flanges were thrown against the rails within distances ranging from 3 to 12 miles. Thus, one application at a point where the oil was sure to be picked up by the wheel flanges, was found sufficient to oil adequately the flange-wearing surfaces of the rails on a number of succeeding curves. The tests made were so successful in minimizing the amount of rail wear that the practice of oiling the rails, as outlined, was extended to all other portions of the Norfolk and Western where the curvature and resultant rail wear justified its use.

#### Mechanical Methods of Applying Oil Were Devised

While the practice had been proved sound, it was apparent that the hand method of applying the oil was slow and costly. In the first place, application of the oil with the brush was in most instances wasteful in the amount of oil used, and in the second place it required the employment of three men on eight-hour shifts at each lubricating point in order that the oil could be applied immediately following the passage of each tonnage train throughout the day and night, these men being assigned specially to this work, except where it was possible to locate the oiling points appropriately and turn the work over to regularly assigned bluff and tunnel watchmen. Where special men were assigned, which was the usual case, approximately 90 per cent of the total cost of oiling the rails was for labor with only about 10 per cent for oil and the brushes used in applying it.

This being the situation, the next logical step in the development of the process was to find a more practical and economical means of applying the oil exactly where it was needed, and to this end some of the section men assigned to oiling the rails by hand, devised contrivances, with the encouragement of the company, which could be pushed by hand so that the rails were oiled as fast as the operator could walk. One of the most successful of these consisted of a simple metal container mounted on a low carriage with double-flanged rollers, which could be pushed along the rails by means of handles similar to those found on the common plow. In this arrangement, after heating the oiling mixture, the oil flows through a short pipe, equipped with a suitable regu-



**Flange Oiler Installed in Main Track**

lating valve, to the top of a brush which distributes it along the gage side of the rail heads.

While these methods were an improvement over applying the oil by hand and effected some saving in oil, the labor cost still remained high. This brought about the general feeling that the solution of the problem lay in devising a means of applying the oil directly to the wheel flanges instead of to the rail. Acting on this principle, a number of the supervisory officers of the Norfolk and Western continued their study of the subject along this line, which led to the development of two or three automatic flange-oiling machines of considerable merit. All of these are designed to be installed within the track, close to the gage side of the rail where passing wheel flanges can pick up a correct amount of oil and carry it to the curves ahead.

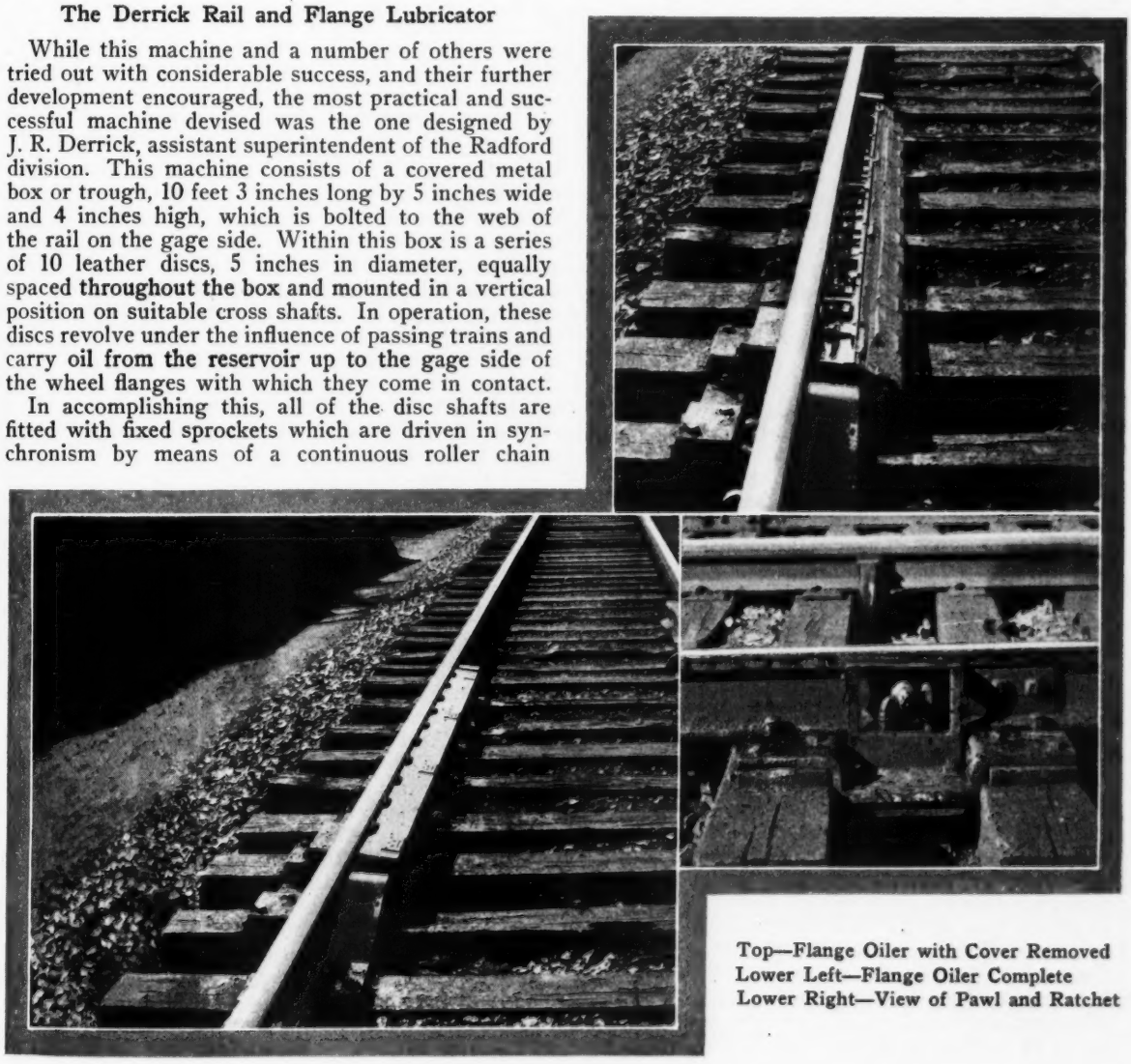
One of these machines is a metal box-like oil container which is rigidly bolted and spiked to the gage side of the rail. This box has a hinged section along the top which is depressed under the action of the wheel flanges of passing trains, opening the top of the oil container and acting against a lever in the bottom of the box, which in turn raises the oil sufficiently to coat a rubber wiper which comes in contact with the side of the rail head and the wheel flanges.

### The Derrick Rail and Flange Lubricator

While this machine and a number of others were tried out with considerable success, and their further development encouraged, the most practical and successful machine devised was the one designed by J. R. Derrick, assistant superintendent of the Radford division. This machine consists of a covered metal box or trough, 10 feet 3 inches long by 5 inches wide and 4 inches high, which is bolted to the web of the rail on the gage side. Within this box is a series of 10 leather discs, 5 inches in diameter, equally spaced throughout the box and mounted in a vertical position on suitable cross shafts. In operation, these discs revolve under the influence of passing trains and carry oil from the reservoir up to the gage side of the wheel flanges with which they come in contact.

In accomplishing this, all of the disc shafts are fitted with fixed sprockets which are driven in synchronism by means of a continuous roller chain operating alternately over the sprockets and under idler shafts spaced between them. Driving of the chain is effected by means of a ratchet and pawl mechanism on a drive shaft at one end of the box through which the relative vertical motion between the rail and the ties at this point is transformed into rotary motion of the ratchet and shaft. In this arrangement the drive shaft extends through the oil box and the web of the rail, and the end is fitted with a fixed ratchet wheel. Operation of this wheel is by means of two pawls, supported by a steel bracket which is fastened securely to two adjacent ties outside of the rail by lag screws. These pawls, which are hung in the plane of the wheel and held against it by means of springs, rack the wheel in a clock-wise direction by means of the relative motion between the rail and the ties under moving loads, sufficient motion of this character being provided by drawing the spikes slightly from the two supporting ties. In this manner, rotary motion is transmitted to the drive shaft and thence, by means of the chain and sprockets, to each of the oiling discs.

In actual service, this machine is installed at the center or quarter point of a rail, preferably about 100 feet ahead of a curve, and in all cases accompanied by the installation of a guard rail immediately



Top—Flange Oiler with Cover Removed
Lower Left—Flange Oiler Complete
Lower Right—View of Pawl and Ratchet

opposite, the purpose of which is to prevent the crushing of the oiling disc between the flanges of passing wheels and the head of the high rail. This guard rail also prevents lateral motion of engine and car wheels and retains their flanges in the desired contact with the oiling discs.

The oil used in this device is a heavy, sticky and viscous oil, now obtainable from the oil companies in the proper consistencies for summer and winter use. While the consumption of the machine is dependent directly upon the amount of traffic over it, the usual consumption of those machines which have been in service ranges from about one-half gallon to one gallon per day.

The Derrick rail and flange lubricator, is now being manufactured and sold by the Maintenance Equipment Company, Chicago.

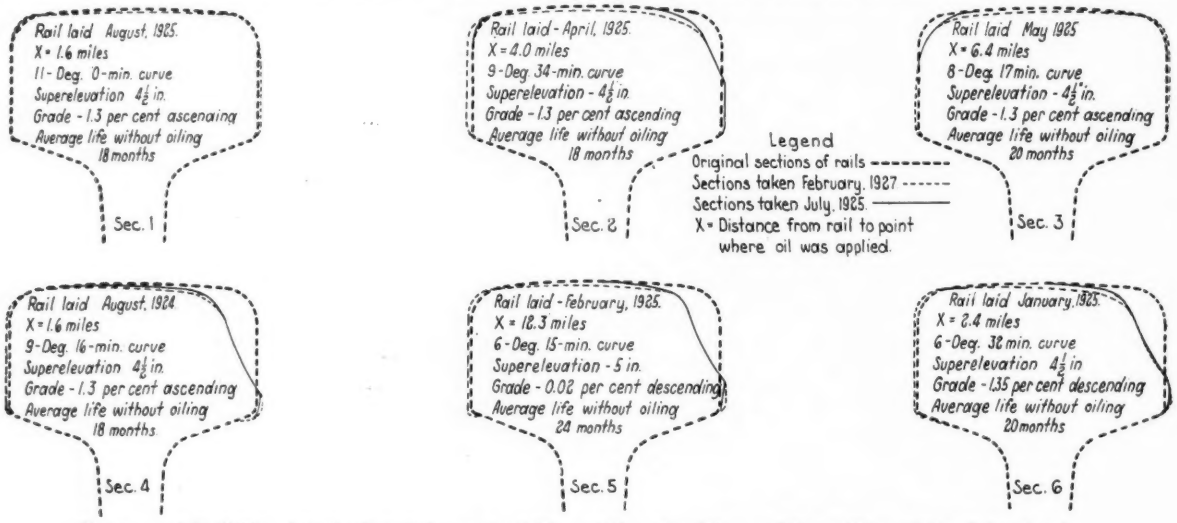
### Oiling Effects Large Economics

The advantages which have been obtained on the Norfolk and Western through flange and rail oiling by the various methods described, have been very definite, the most important of these being the striking reduction in the wear of the rails on curves and the corresponding increase in the service life of these rails, which in most cases has been extended approximately four times. That such unusual results have been and are being obtained in this respect, is evidenced by the accompanying sketches of 130-lb. P. S. rail sections made from actual measurements taken in the track.

These sketches show the original sections of the rails as laid new; the sections of these rails after from 3 to 11 months service without oiling, and also, sections of these same rails about 19 months after oiling was begun. In the last five of these instances, which are typical of the results being obtained on the Norfolk and Western, is shown the excessive rail wear on the gage side of the rail heads in the few months previous to oiling, and the almost negligible increase in the amount of this wear in the 19 months immediately following the oiling. In rail section No. 1, which is that of rail laid shortly after oiling was begun, is indicated also the almost inappreciable amount of flange wear on new rails which have been oiled, after 18 months of service, and this, in this case, in spite of the fact that the rail was located on an 11 degree curve.

Striking also, as indicated by the notes accompanying each rail section, is the apparent effectiveness with which the oil is carried to great distances from the point of application, this distance, in the case of section 5, being over 12 miles. Irrespective of this distance from the point of application, the oil was applied so thoroughly that the excessive flange wear which occurred in the 4 months previous to oiling, was completely stopped in the 19 months during which oil was applied. Evidence that the oil is properly applied and does not reach the top surface of the rail heads, is seen in each case by the fact that whereas side wear was almost stopped, wear on the top of the rail heads continued at the normal rate.

While the accompanying sketches are conclusive as to the actual results being accomplished in the way of lengthening the life of rails on curves by oiling, and indicate indirectly the large savings being made in the cost of rail renewals, to this, in order to get the total savings effected, should be added the labor cost formerly required for the frequent renewal of rails on curves; the labor cost of the frequent regaging of the tracks on curves formerly required due to rail wear; the former loss through damage to ties caused by frequent respiking to gage; the saving through the longer service life given to engine and car wheels, and the less easily computed but no less real saving that is being effected through the acceleration of train movements made possible by decreased friction on curves.




**Sections of Rail Showing the Small Amount of Wear After the Flange Oilers Were Placed in Service**

We are indebted for the information contained in this article to Floyd E. Chabot, assistant editor of the Norfolk & Western magazine.

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TEN YEARS AGO.—Hearings before the Joint Congressional Committee on Interstate Commerce at Washington were temporarily discontinued on March 29 on account of the extra session of Congress. Before adjournment Marcus P. Knowlton, chairman of the board of trustees of the Boston & Maine, explained some of the difficulties experienced in trying to reorganize the Boston & Maine system under the necessity of complying with conflicting state laws, as an illustration of the need for federal incorporation of railroads. In October, 1914, the Boston & Maine operated a system of railroad comprising 25 corporations extending into five states.—*Railway Age Gazette*, April 6, 1917.

# Cotton Belt Holds Annual M. W. and Sanitary Meeting

THE SIXTH annual meetings of the Maintenance of Way and Sanitary Engineering departments of the St. Louis Southwestern were held from March 21 to March 24, inclusive. As in the past the meetings were held at different places to permit as full an attendance as possible without taking the division employees away from their work for more than one day, the same program being followed at each meeting. Thus, two meetings were held on the Texas lines, one at Tyler on March 21 and the other at Texarkana on March 22, while on March 23 and 24 meetings were held at Pine Bluff, Ark., and Paragould, respectively.

The programs for the Cotton Belt meetings differ from those ordinarily adopted for such gatherings in that the heads of almost all of the other departments of the railroad participate in the program, treating of topics in which their departments have a common interest with the maintenance department, thus broadening the viewpoint of all concerned. An interesting point in connection with this feature is the programming of responses by maintenance foremen to certain of the papers presented by representatives of the other departments. The way in which this is accomplished and the wide range of topics presented will be apparent from the program of the meeting at Paragould. The general officers who participate in the programs attend all of the meetings, while the other parts on the program are taken by local officers and foremen on the territories where the meetings are held.

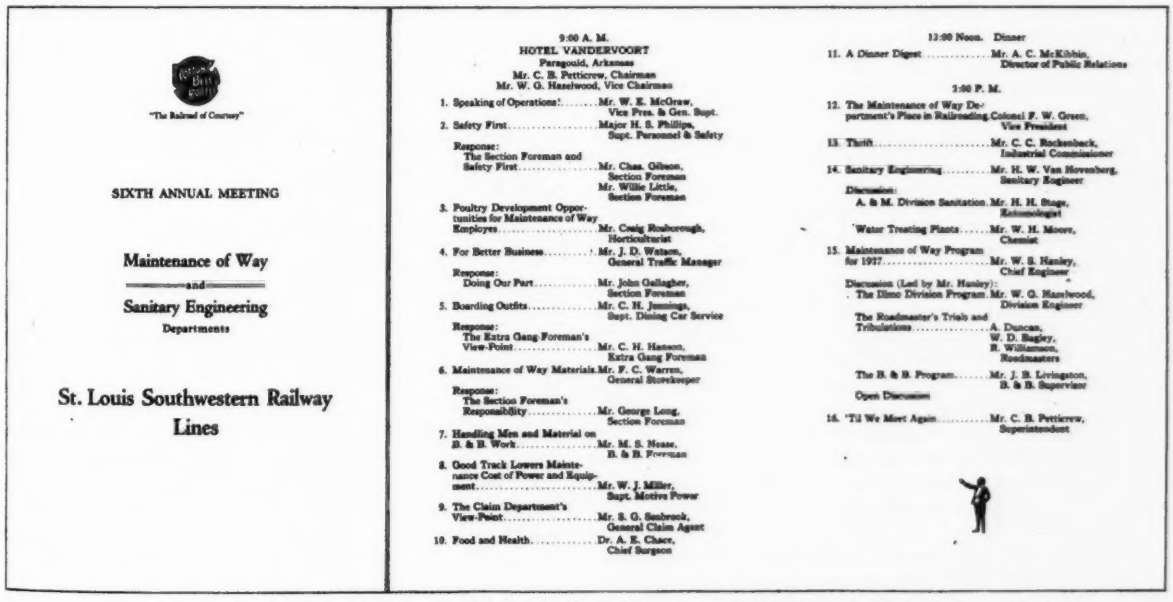
These meetings have been of much value in stimulating interest and co-operation in maintenance of way and sanitary engineering matters. Undoubtedly, the arrangement of the programs and the practice of holding several meetings, each with the same program, have done much to bring about this result by providing a large aggregate attendance without overcrowding any of the sessions, while it also insures a minimum dislocation of the routine divisional work. The mileage and the make-up of the system lend themselves well to this procedure, which has many advantages in its favor.

The address of Col. F. W. Green, vice-president, and some of the other papers presented at the Paragould meeting will be abstracted in this and succeeding issues.

# Derailment Results From Poor Track Conditions

ACCORDING to a report of the Bureau of Safety of the Interstate Commerce Commission, the derailment of a mixed train on the Toledo, Peoria & Western near Smithfield, Ill., on January 25, resulted from bad track conditions. This train, which consisted of a locomotive, 13 freight cars and 3 passenger train cars, was derailed while traveling at a speed variously estimated to have been between 20 and 40 miles an hour, the locomotive and all of the cars except the last two leaving the track. The testimony of the men riding in the cab as well as the condition of the track after the accident indicated that the rails had spread and there was no evidence of any defects in the locomotive which could have been held responsible for the derailment. No rails were broken and when the track was repaired the spikes were driven in the same ties that were in the track when the derailment occurred but some tie renewals were made later.

Examination of the track approaching the point of the accident showed that the gage was open and varied from 4 ft. 8¾ in. to 4 ft. 9¼ in. It was also found that there were two successive ties in the track at the approximate point of the derailment which were so decayed and broken that they would not hold the spikes and that from four to six ties per rail length were in such condition as to require renewal, while a large number of spikes were found to have worked loose in the ties. The heads of many spikes were 2 in. above the bases of the rail. The conclusion of the report is that with track in this weakened condition the nosing of the engine probably caused the rails to spread.



"The Railroad of Courtesy"

SIXTH ANNUAL MEETING

Maintenance of Way
and
Sanitary Engineering
Departments

St. Louis Southwestern Railway Lines

9:00 A. M.
HOTEL VANDERVOORT
Paragould, Arkansas
Mr. C. B. Petticrew, Chairman
Mr. W. G. Hazelwood, Vice Chairman

1. Speaking of Operations!.....Mr. W. E. McGraw, Vice Pres. & Gen. Supt.
2. Safety First.....Major H. S. Phillips, Supt. Personnel & Safety

Response:
The Section Foreman and Safety First.....Mr. Chas. Gibson, Section Foreman
Mr. Willie Little, Section Foreman

3. Poultry Development Opportunities for Maintenance of Way Employes.....Mr. Craig Roxborough, Horticulturist
4. For Better Business.....Mr. J. D. Watson, General Traffic Manager

Response:
Doing Our Part.....Mr. John Gallagher, Section Foreman

5. Boarding Outfits.....Mr. C. H. Jennings, Supt. Dining Car Service

Response:
The Extra Gang Foreman's View-Point.....Mr. C. H. Hansen, Extra Gang Foreman

6. Maintenance of Way Materials.....Mr. F. C. Warren, General Storekeeper

Response:
The Section Foreman's Responsibility.....Mr. George Long, Section Foreman

7. Handling Men and Material on B. & B. Work.....Mr. M. S. Nease, B. & B. Foreman
8. Good Track Lowers Maintenance Cost of Power and Equipment.....Mr. W. J. Miller, Supt. Motive Power
9. The Claim Department's View-Point.....Mr. S. G. Seabrook, General Claim Agent
10. Food and Health.....Dr. A. E. Chace, Chief Surgeon

12:00 Noon. Dinner

11. A Dinner Digest.....Mr. A. C. McKibbin, Director of Public Relations

2:00 P. M.

12. The Maintenance of Way Department's Place in Railroading.....Colonel F. W. Green, Vice President
13. Thrift.....Mr. C. C. Rockenbeck, Industrial Commissioner
14. Sanitary Engineering.....Mr. H. W. Van Hovenberg, Sanitary Engineer

Discussion:
A. & M. Division Sanitation.....Mr. H. H. Stage, Entomologist
Water Treating Plants.....Mr. W. H. Moore, Chemist

15. Maintenance of Way Program for 1927.....Mr. W. S. Hanley, Chief Engineer

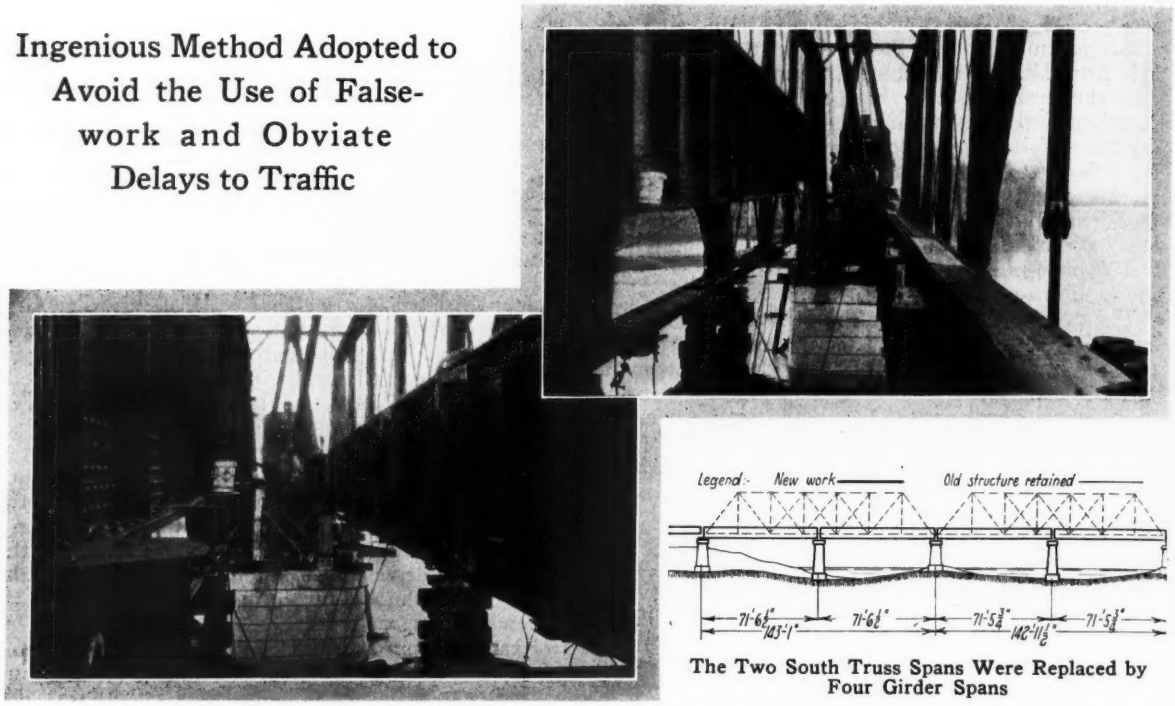
Discussion (Led by Mr. Hanley):
The Illmo Division Program.....Mr. W. G. Hazelwood, Division Engineer
The Roadmaster's Trials and Tribulations.....A. Duncan, W. D. Bagley, R. Williamson, Roadmasters
The B. & B. Program.....Mr. J. B. Livingston, B. & B. Supervisor
Open Discussion

16. 'Til We Meet Again.....Mr. C. B. Petticrew, Superintendent

Program of the M. W. and Sanitary Engineering Departments of the St. L. S. W. at Paragould, Ark.

# Erection of Girder Span In

## Ingenious Method Adopted to Avoid the Use of Falsework and Obviate Delays to Traffic




**The Two South Truss Spans Were Replaced by Four Girder Spans**

BY USING existing trusses as a means of supporting new girders during the process of erection, four truss spans were replaced by seven girder spans without the use of falsework and with no interruption to traffic. This operation was carried out in renewing the superstructure of the White River bridge on the Indianapolis division of the Pennsylvania near Seymour, Ind.

The original bridge at this site consisted, from north to south, of 24 deck girder spans 39 ft. 6 in. long and one 55 ft. long, four pin-connected through truss spans 140 ft. long, one deck girder span 55 ft. long, and 9 deck girder spans 39 ft. 6 in. long. The renewal project included the replacement of six of the 39-ft. 6-in. spans as well as the 55-ft. span at the north end of the bridge with new spans of the same length, the replacement of the two north truss spans with three deck girder spans 94 ft. 9 in. long and the two south truss spans with four deck girder spans 71 ft. long, as well as the replacement of the entire south approach with five new deck girder spans 54 ft. 9 in, long.

The renewal of the south approach required an entirely new substructure, while the replacement of the 7 girder spans in the north approach called for no new masonry except the remodeling of the pier tops. The replacement of the truss spans with girder spans of different lengths required four new piers and the abandonment of one as indicated on the plan, as well as the remodeling of the tops of four old piers to accommodate the new girders. The change in the pier tops was also necessitated by reason of a raise in the grade line of the track across the bridge an average of 3 ft. to permit the use of deck girder spans in place of through truss spans. To avoid an excessive reduction in the headroom above the stream, the girder spans, which replaced the truss spans, were all given a uniform depth of 7 ft. back to back of angles, which is appreciably less than the economical depth for the longer girder spans.

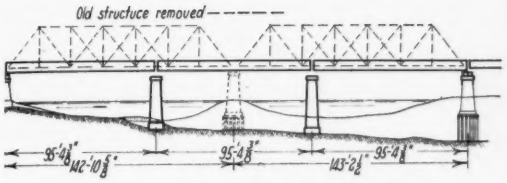
As there is little refrigerator traffic over the line carried by this bridge it was decided to use an open deck floor instead of a concrete ballast floor commonly applied to girder bridges on the Pennsylvania, as the use of an open deck greatly simplified the erection problem. If a concrete deck had been required, it would have been necessary to have erected the new spans on falsework alongside the old structure and after placing the deck slabs on them, roll them into position, or else provide short pre-cast slabs to be erected after the new steel was in place. This, however, would have entailed a considerable extension of the erection period, with a resulting increase in the time during which traffic restrictions would have had to be imposed.

### Use of Falsework Inadvisable

The renewal of the superstructure in the approaches involved no particular difficulty. The girders for each span were erected as a unit by a derrick car in rapid succession, the group of five spans in the south approach being all erected in one day. The replacement of the truss spans by girders imposed more severe limitations. The White River is subject to severe floods and the masonry contractor, the Mead-Balch Construction Company of Indianapolis, Ind., experienced several interruptions to its operations and considerable damage to plant facilities several times during the course of the substructure work. In view of this, it was deemed inadvisable to use falsework for the superstructure changes, as was definitely borne out by a sudden rise of water that

# an Imposes Serious Problem

The erection procedure is depicted in the views from left to right. After the east girder was lowered to bearing, the derrick car swung the north end of the west girder east after which a hitch was taken from the needle beam falls and the girder swung into line and set in place.




**The Two North Truss Spans Were Replaced by Three Girder Spans**

carried a considerable ice flow during the time that the erection was in progress. Accordingly it was decided to erect the new girders inside the old trusses, removing the old floor system as the work progressed.

The erection procedure was essentially the same for all of the girder spans except that the conditions were somewhat more critical in the case of the third 94-ft. 9-in. girder span from the north end, since this span had to be placed after all of the floor system and bottom laterals were removed from the truss spans, thereby introducing the necessity for extreme care in handling the girders which were supported by the old trusses while without any lateral stiffness in the plane of the bottom chords. The procedure in erecting this girder span, which was the last of these three spans to be placed, was as follows:

The first step was to remove the portal bracing at the north end of the truss span to clear the boom of a bridge derrick car which was moved into position on the south end of the girder span previously erected. A line from the hoisting engine on this derrick car was run to a set of falls suspended from needle beams spanning across the top chords at the south hip joint of the truss span.

Next, the new girders were hauled in from the south on a flat car that was spotted directly over the final position of the girder span. Hitches were then taken on the west girder from the needle beams and from the boom of the derrick car and the girder was lifted off the car and set clear of it on blocking supported on the piers and extending up between the west truss and the adjacent stringers.

Following this, hitches were taken on the east girder in such a position that when it was lifted clear of the car it would be directly over its final location on the bearing shoes. After the car was released, 20 minutes was occupied in removing the rails and ties and 48 minutes in completing the removal of the floor system. This required the removal of bolts from all connections of the stringers to the floor beams and of the hip verticals to the hanger floor beam, bolts having previously been substituted for rivets in these connections. It also required the burning off of the ends of the three other intermediate floor beams, this operation having been started immediately after the last train crossed the bridge. As the floor members were removed they were dropped into the river but the precaution was taken to secure each member with a piece of wire rope that was also tied to some part of the old truss span so that the old floor members could readily be recovered later.

### Avoid Lateral Strain on Trusses

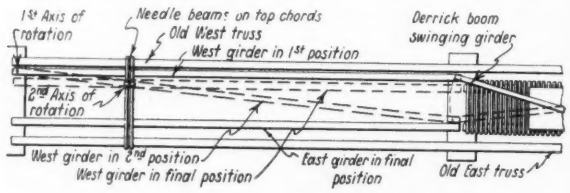
With the floor removed, the east girder was lowered directly into position on the shoes in six minutes time. The next step, that of moving out the west girder from its position close to the west truss, was a more critical operation. The end of this girder nearest the derrick car could be moved out readily by a side swing of the derrick boom but in the absence of any effective trolley to obtain a sidewise movement of the fall lines extended from the needle beams supported on the truss at the other end of the girder, a lateral movement of that end would have entailed a side haul on the girder while it was suspended from a fixed position of the tackle secured to the needle beam and it was feared that this would have produced a dangerous distortion of the trusses in the absence of the bottom lateral bracing.

To avoid this an ingenious horizontal teetering or turntable movement of the girders was devised, by

means of which it was moved to correct position without endangering the stability of the trusses. With the girder supported at the south end on the blocking over the pier, the north end was lifted by the derrick car and swung eastward toward the other girder, as shown in the sketch. In this position the longitudinal center line intersected the center line of the west line of girders in the bridge directly under the needle beam. Then by attaching the fall lines from the needle beam and hoisting the girder clear of the blocking on the south pier, the derrick car was able to swing the girder into parallel position without any lateral swing in the line from the needle beam, following which the girder was lowered to its bearings. This entire operation occupied only 14 minutes.

### How the Bracing Was Connected Up

The ties and rails were placed while the cross bracing and laterals were bolted in position and the bridge was ready for traffic in 2 hours and 36 minutes after the track had been cut. The placing of the cross frames was greatly facilitated by an ingenious expedient of bolting them all to one of the girders by


1st Axis of rotation
Needle beams on top chords
Old West truss
West girder in 1st position
Derrick boom swinging girder
2nd Axis of rotation
West girder in 2nd position
West girder in final position
East girder in final position
Old East truss

**How the West Girder Was Handled**

a single bolt through the bottom and top lateral plates, thus producing, in effect, a pair of hinges on which the cross bracing could be swung flat against the girder and later swung out for completing the connection to the opposite girder.

The elaborate erection procedure described above for the west girder of the south 94 ft. 9 in. span was not necessary in the erection of the other 94 ft. 9 in. spans because it was only in the case of the south span that it was necessary to remove the entire floor and bottom lateral systems of the truss span before the side swing of the west girders could be made. Consequently, the truss spans were capable of resisting a greater degree of lateral distortion when the other two girder spans were erected. This complication also did not enter into the erection of the 71 ft. girder spans because these spans were assembled complete in the fabricating shop and erected as units.

### Strut Trusses Against Girders

After each girder span was erected pains were taken to insure the stability of the truss spans in the absence of the bottom lateral bracing until such time as they could be removed. This was done by strutting the trusses to the new girder spans by means of short angles bolted to the outside stiffeners through holes that were provided for the ultimate connection of sidewalk brackets. The trusses were brought to secure bearing against the angle struts by cables run from the posts of one truss across the tops of the girders to the posts of the truss on the opposite side. The trusses were later dismantled by cutting them into two parts which were carried out by the derrick car.

This reconstruction job was under the jurisdiction of W. L. Ekin, chief engineer maintenance of way, Western region, Chicago, who was represented in the field by C. A. J. Richards, assistant engineer. The steel work was designed by J. F. Leonard, engineer of bridges and buildings at Pittsburgh, Pa. The work was done under the direct supervision of D. P. Beach, division engineer, C. D. Howell, master carpenter, and J. H. Fox, inspector. The steel erection was handled by the Ferro Construction Company.

## Genesis of The Hand Car

ENTHUSIASTS for the motor like to refer to the hand car as a relic of antiquity, but this is because they do not realize that the pump or walking-beam type of car as we know today is a highly efficient form of hand-propelled machine as compared with those which antedated it. The modern hand car, if any hand car may be called modern, represents the result of a gradual development from various primitive schemes to improve on the push

**The Crank Hand Cars in the "Grave Yard" (The Necessary Belts Are Missing)**

car. The two photographs reproduced herewith illustrate one of the ancestors of the pump car, which, while by no means efficient, was far more practical than some of the earlier forms of mechanically-propelled cars. This becomes apparent from a reading of the following abstract from a report accompanying the two photographs which were discovered in an old file by J. D. Keiley, division engineer, Chesapeake & Ohio, Clifton Forge, Va., to whom we are indebted for the information presented here. As

**These Cars Were for "High Speed" Service Only**

no date appeared in the report, it is impossible to say when it was written, but the reader must bear in mind that statements in this report referring to the present relate to the time when the report was written and not to today.

"In this country we originally used push cars and then the men provided the cars with a pole and by shoving this pole on the ties would pole the car along. I understand there are now some places down south and on small branch lines where they still propel the cars in this manner.

"The next step was to provide the hand cars with gears and a crank. Two men would sit down on the deck of the car facing each other and turn the crank until they became exhausted, when two other men would take their places. They had a little trouble in keeping their coats out of the gears, and I understand that quite a few accidents resulted from men getting caught in these gears.

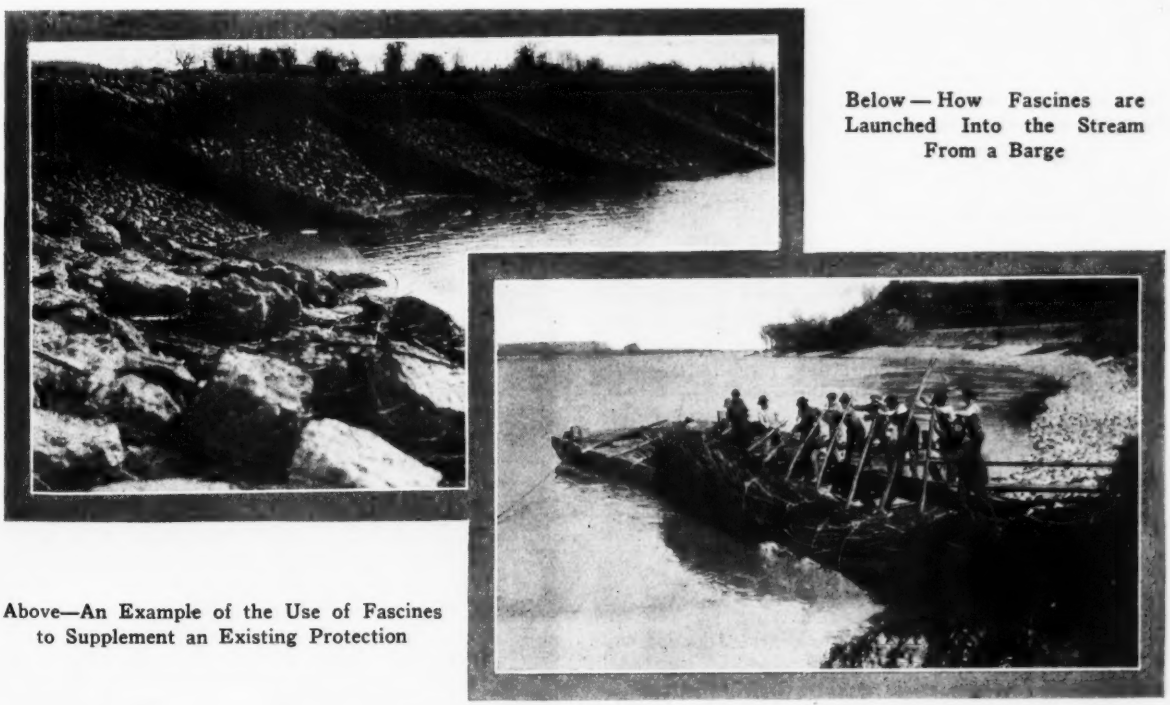
"For inspection purposes and light loads they conceived the idea of placing a large roller up in the air with a crank on each side and operating the car by a belt. These outfits were called flyers, and were considered very fast cars, but on account of the belt trouble they were not generally used for section gang work. Other belt drive hand cars were developed. The photographs attached hereto show some cars still in the railroad yard on the Boston & Maine, but I do not believe they are in use any longer there.

"About this time the section men were pumping the water for the wayside watering tanks and a walking beam pump was invented for these wells, permitting the whole crew to pump at one time. Eventually some enterprising person conceived the idea of putting a similar walking beam on the hand cars and driving the cars by the walking beam, and this was considered a very marked improvement, because all the men could help propel the car at the same time."

# Thoroughly Tried Device Stops Scour in Rivers

THE BRUSH and rock fascine has long been recognized as a practical and efficient means of stopping the erosion of river banks, but owing to the greater attention directed in recent years to some of the newer forms of bank protection, there has been a tendency to overlook the fascine as a useful aid in times of emergency. The fascine is not as suitable for permanent protection as other means of guarding the banks or of retarding the current, but in times of emergency when the bank is cutting away at a rapid rate and something must be done quickly to save valuable property or prevent the undermining of railway tracks, fascines, which are quickly made and readily applied, have often stopped the cutting of the bank when other methods failed. The photographs illustrate applications of this emergency protection on the Atchison, Topeka & Santa Fe.

Fascines are long, round bundles of brush and rock. They are placed on the river bank in an inclined position with the upper end securely fastened to a "dead man" buried at a safe distance back from the top of the bank and the lower end in the bed of the stream. As shown in the sketch, they are made around a central core, consisting of a ¾-in. or 1-in. wire cable, extending from end to end. Around the cable is a core of one-man stone 18 in. in diameter, and this core is surrounded by a layer of brush sufficient to make a cylindrical bundle about three feet in diameter, held in

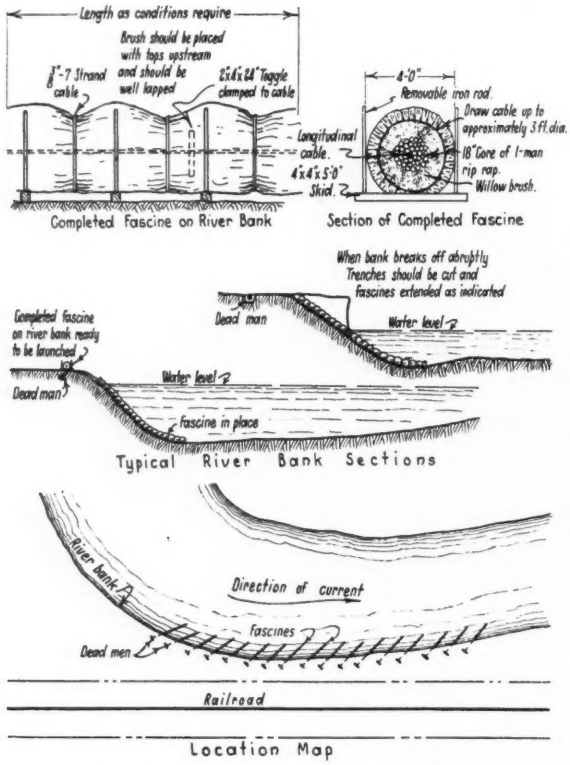


Above—An Example of the Use of Fascines to Supplement an Existing Protection

Below — How Fascines are Launched Into the Stream From a Barge

shape by wrapping it at intervals along its length with 3/8-in. diameter seven-strand cable.

When the river is cutting an unprotected bank or is threatening to cut under or flank existing protection, such as willow mattress revetment, fascines are placed on the bank in the position shown in the photographs. One of the views shows how the lower end is launched




**How the Fascines are Built and Placed**

from a barge. The length, size and spacing of the fascines depend on the depth of the water, the height of the bank and velocity of the current. The length should be sufficient to extend from the bottom of the cutting bank to a point well above possible high water level. In some cases, lengths of as much as 90 ft. have been used. Good results have been obtained with fascines three feet in diameter. Where the depth of scour is less and the current is less rapid, smaller and shorter fascines will serve the purpose. The spacing also varies, 40 ft. having proved effective under average conditions. Where the scour has cut the bank so that it stands almost vertical, it is desirable to dig trenches on a slope through the top of the bank so that the fascines may be laid on a fairly uniform slope for their entire length.

After this construction has proved effective in stopping the scour, it is desirable that it be replaced by more permanent protection. For example, in one case on the Santa Fe a woven willow mattress loaded with riprap was built after the water stage had receded to a level that was more favorable for its construction.

We are indebted for the above information to G. J. Bell, district engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.

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A COMPREHENSIVE REPORT.—"Yardmaster, Delta. The cow that was killed last night was a bull and she ain't dead yet. Send some track spikes quick, the last you sent were bolts."—*D. T. & I. Railroad News.*

# Use Shims to Protect Ties

A NOVEL experiment in the interest of protecting and prolonging the life of cross-ties is being conducted on the Kansas City Southern, which is now installing some 280,000 wooden shims under the tie plates on several test sections of main line track with the view of determining the effect of such a measure in reducing the mechanical destruction of the ties by the gradual wearing of the tie plates into their upper surface.

The shims being used on the Kansas City Southern are made of cottonwood which, because of its long fibre structure, is highly resistant to cross-grain cutting, and splitting. The shims are $\frac{5}{16}$ in. thick and are 7 in. wide by 10 in. long, the same size as the tie plates being used. In order to protect the shims from decay, they have all been treated with 8 lb. of creosote per cubic foot of wood.

The particular piece of track selected on which to make one of the test installations is a section four miles long which was constructed in 1914 on a roadbed graded in 1912. In this section, a full ballast section had been applied and maintained and all of the ties are of treated red oak, fully plated. After twelve years of service there are remaining in this track approximately 95 per cent of the ties originally installed. However, the fact that considerable damage had been done to practically all of the ties by the wearing effect of the tie plates, led to the selection of this particular piece of track for the test shim installation. In addition to applying shims on this section the Kansas City Southern is placing the shims under each of the tie plates on the 37 miles of new rail which it is laying in this year's program.

The use of the shims on the Kansas City Southern is the result of an effort on the part of that road to increase the life of its ties, and was brought about upon the suggestion of Dr. Herman Von Schrenk, consulting timber engineer, after a thorough examination of the ties in the tracks being used as test sections. While it is too early to observe any of the merits of the test being made, it is confidently expected that considerable benefit will be derived from the application of the shims.

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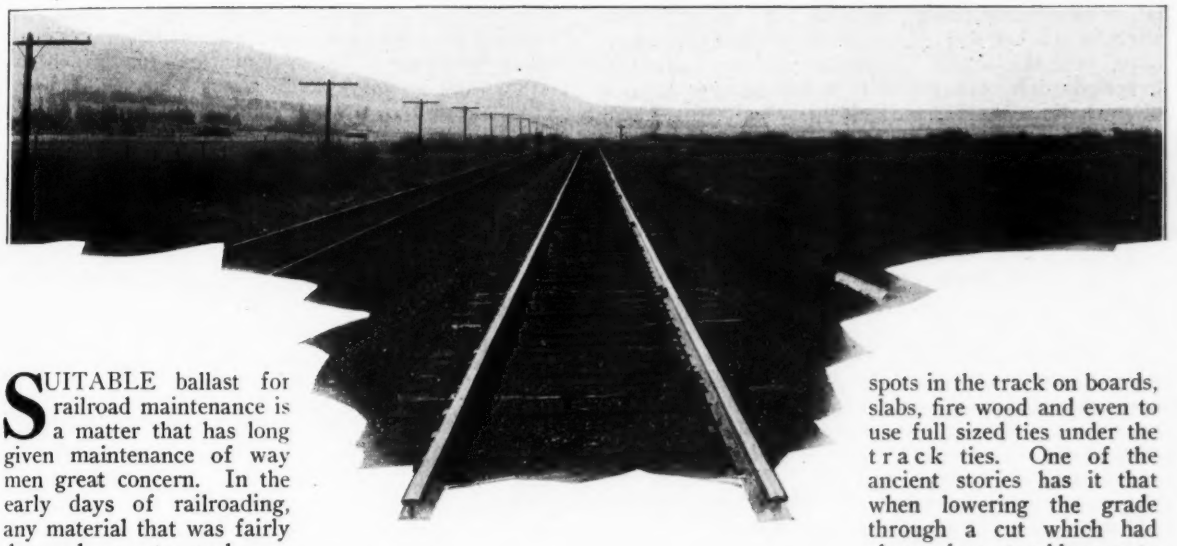
**Two-Span Bridge of the Southern Railway Over Talladega Creek**

# Why Gravel for Ballast Should be Carefully Selected*

## Present Day Traffic Imposes Greater Requirements on the Track Substructure

By F. J. STIMSON,
Assistant Chief Engineer Maintenance of Way, Pennsylvania, Western Region



SUITABLE ballast for railroad maintenance is a matter that has long given maintenance of way men great concern. In the early days of railroading, any material that was fairly dry and easy to work was used as ballast and thousands of miles of track were put on material that was cast up from the sides of the roadbed. This in many places was clay, loam or gumbo and made what we call today "mud ballast."

As the first consideration with such ballast was to get the water away from the track as quickly as possible, a "gable roof" was formed of this roadbed material with a ridge along the center of the track at about the level of the top of the rails and a slope extending each way from this ridge in planes that would pass through about the bottom of the ties at each end and which were continued to meet the slopes of the embankment or the ditches where ditches were maintained. This, by the way, seems to have been the origin of a form of roadbed section which is still used to a considerable extent for good gravel ballast. The only explanation for this is power of habit.

At a time when it was of prime importance to keep water from soaking into the ballast the use of the "gable roof" form of track dressing was highly desirable, but now when material, selected especially because it will let the water drain through it readily, is used and dressed in the same general shape as mud ballast, thus forming a weakened track support—one which invites center bound track—the original reason is lacking and nothing but a blind adherence to past practice can explain it.

While the old mud ballast gave fairly good results under favorable circumstances the track conditions became frightful during wet weather and especially during alternate thawing and freezing. It was the common practice during such periods to block up bad spots in the track on boards, slabs, fire wood and even to use full sized ties under the track ties. One of the ancient stories has it that when lowering the grade through a cut which had always been troublesome to maintain, enough ties were covered to relay the track. This may be taken with a grain of salt, but no one will question the statement that track conditions were deplorable and that the track man's job was no sinecure in the days of old.

The disadvantages of mud ballast soon led maintenance of way men to make use of gravel for ballast in the form that it was found in natural deposits, and the beneficial effect upon track maintenance was very marked. In the earliest use of bank gravel a lift of five inches to six inches was deemed entirely adequate but often only enough was unloaded to "whitewash" or cover the surface of the roadbed to a depth of one or two inches.

### A Heavy Bed of Good Ballast Is Essential

This was a very common error in the early days and there is reason to believe that it is still all too common. Within a year or so after being applied, such ballast has been forced down and mixed with the sub-grade material and has become worthless as ballast. When another light lift is given, the process is repeated. The natural consequence of this is that while within a period of comparatively few years sufficient ballast has been used to obtain good results, the actual results secured have been of an indifferent character because the mixture of the gravel with the foul material of the sub-grade is little better than the sub-grade material alone.

Even where the lift given was enough to prevent the ballast from actually mixing with the sub-grade material, it has been found that under the constantly increasing axle loads the ballast does not hold up. So instead of making a lift of 6 or 8 in. we find the

*Abstract from a paper presented before the National Sand and Gravel Association at Cincinnati, Ohio, on January 18.

roads now going to a ballast program that calls for 12 to 14 in.

But it has been found that adequate depth of ballast is not the only requisite for good results. Thus, after greater depths of ballast have been applied and the track has been carefully surfaced and lined, the trains would glide smoothly over it and we could congratulate ourselves that we had a fine piece of track. But after a few weeks' use, we would begin to hear invidious comments from the traveling public, and learn to our sorrow that the track was indeed rough. Our ballast was adequate in quantity but deficient in quality.

Quality of ballast not only bears an important relation to holding power but may have an important effect in another way. Everyone knows of the annoyance, yes, the actual discomfort and even distress experienced by the traveler in a ride over a piece of track that was surfaced on dusty ballast. As the demands increased for ballast that would maintain a better riding track and insure the passenger a cleaner ride the railroads endeavored to improve upon gravel ballast by requiring that the gravel taken from the natural deposits be put through various forms of preparation. At first it was thought possible to overcome the difficulty by limiting the amount of sand and by taking out the coarsest of the cobble stones but this did not prove effective. Washing plants were built and gravel was prepared for use as ballast by washing it to remove the dirt, clay and loam; by screening it to control the sand content; and by segregating the coarse material, crushing it and returning it to the output for use as ballast.

The problems were still unsolved. Ballast was produced at some plants and at some pits that had too much or too little coarse aggregate; too little or too much fine aggregate; or contained too much dirt, clay and loam. In short, it was not a uniform or satisfactory product and it became apparent that a specification was necessary which would cover the preparation of gravel for ballast—one that would fix the general portions of the aggregates and limit the amount of impurities.

### A. R. E. A. Specifications for Gravel Ballast

The outcome has been the adoption as "recommended practice" by the American Railway Engineering Association of: (1) a roadbed section calling for 12 in. of sub-ballast and 12-in. of top ballast measured from the bottom of the tie; (2) a set of specifications for washed gravel to be used as top ballast setting forth the proportions of the various sized aggregates that must be provided and limiting the maximum percentage of those sizes that are not wanted, but which will be tolerated as coming within reasonable commercial practices.

When we recall the increase in the weight of engines and loaded cars since railroading began, the great need for better ballast material can readily be understood. Starting with cars so light that one corner could almost be lifted by a strong man, they have gradually become heavier so that we are now carrying on our tracks axle loads of from 65,000 to 75,000 lb. Once a speed of 20 miles per hour was fast; now speeds of 70, 80 and even 85 miles per hour are attained on some lines. Such enormous loads moving at such great speeds mean an almost inconceivable burden on our track and it must all be absorbed by the ballast.

Is it any wonder that the railroads insist on a rigid enforcement of specifications? Is it any wonder that they reject material that contains too much dirt and loam, too much sand, too much or too little coarse aggregate, too little or too much small aggregate, or material that is poorly mixed in the car so that one stretch of track is covered with ballast in which there is little or no aggregate smaller than ½ or ¾ in. and another stretch with material in which the aggregate is all or nearly all under ¼ in.?

It is true that the exact mixture as to size of aggregate which will make the best ballast is not known. The writing of specifications for ballast is not by any means an exact science. But having observed the action of this ballast and the performance of that, having discussed among themselves and with producers the problems of developing the best combinations, the composite conclusions were reduced to definite language in the specifications for gravel ballast adopted by the A. R. E. A.

The alternative is stone ballast. It costs more to buy. It costs more to apply. It costs more to work. But it reduces, if it does not eliminate, the dust nuisance. It holds track in surface and line longer after each working. It tends to prolong the life of ties. It lessens to a degree the wear on the rails. In short, it is a direct, a strong and an imminent competitor with gravel wherever traffic is very heavy and very fast.

## Protecting Steel Bridges With A Crude Oil Coating

AN INTERESTING experiment in the use of crude oil for protecting the floor structures of steel bridges which are subject to severe corrosive action, has been carried out for some time on the Chicago, Rock Island & Pacific with apparently complete success and at a considerable saving over the cost of painting. The experiment was made on the Rock Island's Kansas river bridge at Topeka, Kan., which consists of six 155-ft. through riveted single track spans, the floor structures of which had been subject to severe corrosion. The direct cause of this corrosion has been brine drippings and the constant accumulation of cinders and other debris on the floor system as a result of the frequent train movements over this bridge which reach about 65 trains daily.

Confronted with this problem in several instances, the division forces of the Rock Island have been experimenting for a considerable period in the preservation of steel structures by the use of crude oil. These experiments have been carried on by the application of crude oil to the bridge members semi-annually at the time when the track forces oil the rail joints and switches. The results of this oiling of the bridge members were so satisfactory in retarding corrosion that it was decided to apply the oil under pressure to all parts of the floor system on the Kansas river bridge.

The location of an enginehouse a short distance from the bridge, from which compressed air could be easily obtained, made this system highly applicable in this case. In accomplishing the work, a line of second hand 1½-in. pipe was laid from the enginehouse across the bridge with connections at frequent intervals for tapping the line. The preservative used consisted of a mixture of crude oil and kerosene, which was applied at a pressure of 80 lb. With this pressure, the oil was forced into every joint and under all places where scale had started. The force of the application also cleaned off the sand, cinders and ashes which had accumulated in the corners of the floor system. The total cost of

the work, including labor and materials, amounted to $394, or 42 cents per lineal foot of the bridge. The entire cost of the work is tabulated below:

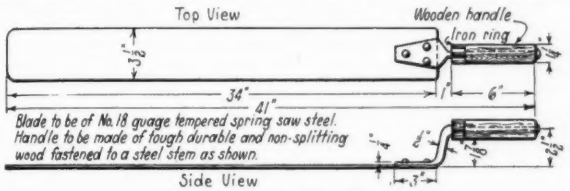
| | |
|---|---|
| Coal, oil and water for the stationary plant | $ 10.60 |
| Labor laying temporary pipe line | 94.32 |
| Oil and kerosene | 33.80 |
| Labor of painters | 255.35 |
| Total | $394.07 |

It is evident that the total expenditure for this work was materially less than it would have been if the floor structure had been protected by the application of paint, and while the coating applied may not be as permanent as certain types of paint or other special metal preservatives, it is felt that the crude oil application will afford satisfactory protection for a considerable period of time. The protection of this bridge was done under the direction of C. C. Cunningham, division engineer of the Rock Island at Herington, Kan.

# Surfacing Track With an End Tamping Trowel

By C. R. ADSIT
Assistant Division Engineer, Baltimore & Ohio, Garrett, Ind.

JUST AS long as railroads are maintained, they will have to be kept in good surface to afford the high standard of smooth riding track that is so necessary at the present time. A large number of railroads are gradually adopting limestone and crushed slag ballast; nevertheless, there is a large percentage of the mileage of the country that is still maintained on soft ballast, which makes it necessary


Top View
Wooden handle
Iron ring
34"
41"
6"
Blade to be of No. 18 guage tempered spring saw steel.
Handle to be made of tough durable and non-splitting wood fastened to a steel stem as shown.
Side View

**The End Tamping Trowel**

to devote more time to surfacing, especially where the equipment is heavy and the traffic dense.

During the past few years the rates of pay for track labor have increased greatly and it has become necessary that railroads adopt labor-saving tools and machinery which will expedite the work and at the same time dispense with manual labor wherever possible. It is a result of this condition that the end tamping trowel is becoming more extensively used on the Baltimore & Ohio from year to year.

### First Tools Were Made From Old Saws

The first of these tools, made locally by foremen and called the end or saw tamper, were of crude construction, being made from pieces of old cross-cut saws by cutting off the teeth and riveting a handle on one end. They were tried and found effective and after a time such decided improvement was noted in riding conditions that officers began to take interest in the matter and as a result a standard tool was developed.

After a thorough study and numerous tests, it was decided that a device much the same as an elongated trowel was the proper tool. This trowel is made of No. 18 gage tempered spring steel 34 in. long and 3½ in. wide, to which is riveted a 6-in. handle having a 1¼-in. wood grip, and having a 2½-in. raise, as shown in the sketch.

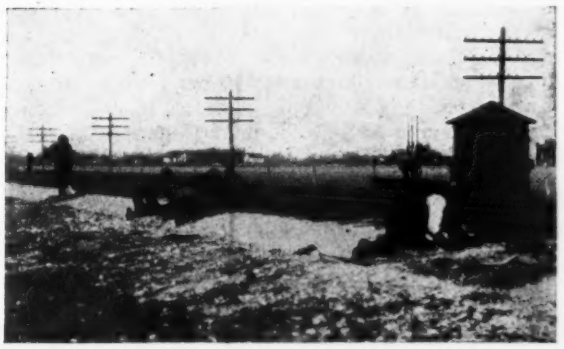
This tool is designed for use in soft ballast, such as cinder, granulated slag or fine gravel, where the raise is between ½ in. and 1½ in. It has been found that where the raise is over 1½ in. and out of face the use of shovels is more economical. It is best adapted to surfacing joints and correcting irregular cross level and elevation, and even a small gang can maintain an ordinary section in good riding condition. It is recommended that a gang of five or six men be equipped with at least four of the tools, but a foreman and three or four men can use them to good advantage, although they will not be able to accomplish as much as the larger gang.

### How the Trowel Is Used

The proper method for using the tool to the best advantage is as follows:

(1) The foreman and two men with jack, level board, shovel and end tamping trowel, raise the low spots, using the level board. The foreman, after sighting the raise, marks the ties to be tamped. The man with the shovel cleans the ballast away from the ends of the marked ties, being careful to remove all ballast to the bottom of the tie. The man with the jack tamps the two jack ties and the men proceed to the next place to be raised.

(2) The balance of the gang, with the end tamping trowels, follow along, tamping the marked ties by scooping up a trowel of ballast and working it underneath the ties from the end, being careful to distribute the ballast evenly and firmly from a point eight inches inside of the rail all the way out to the end of the tie.



**A Foreman and Three Men Using End Tamping Trowels for Surfacing Track**

(3) One man follows along behind with a shovel, dressing up the ballast, thus making a complete operation and leaving a finished job at all times.

If the gang is small it is necessary at times for all hands to use the trowels and a slight change in the organization may be necessary, which change is left to the judgment of the foreman in charge.

By careful study and the use of good judgment on the part of the foreman, it has been found that there is really no hard and fast rule governing the exact method to be used, as local conditions have to be taken into consideration. For instance, if the joints are mashed or the rail surface bent, it has been found that if the joint ties are hit down with a maul or sledge after the joint ties are tamped, and before the other ties are tamped, it gives the joint ties a certain advantage over the others and contributes towards more solid joints. Also, it has developed that where spot surfacing is done the raise should be a trifle high, possibly one-half bubble of the level board, to allow for the settlement which is bound to occur when the first train passes over.

**Costs of Trowel and Shovel Tamping Compared**

| | | |
|---|---|---|
| Shovel tamping | Average time per tie end.....0.12 hours | |
| | Average cost | $0.05 |
| End tamping | Average time per tie end.....0.043 hours | |
| | Average cost | 0.022 |
| Estimated saving per tie end—End tamping versus shovel tamping | | 0.028 |
| Per cent saving in labor | | 56 |

After numerous comparative studies on surfacing, by shovel tamping and by the use of the end tamping trowel, where conditions were practically the same, the results shown in the opposite column were noted.

This saving does not necessarily mean that the force can be reduced 56 per cent but 56 per cent more surfacing or other work can be accomplished with the same force, which is of vital importance to the maintenance of way department of any railroad.

There are also other advantages to be obtained by the use of this tool, which should be taken into consideration, namely:

(1) Tamping is done without disturbing the ballast between the ties, which eliminates the dressing of the ballast in cribs.

(2) The old bed underneath the tie is not disturbed.

(3) Ballast is placed evenly and uniformly underneath the ties, which cannot be done by shovel tamping, especially where the raise is slight.

(4) Since the ballast shoulder is broken down, better drainage is afforded.

# The Maintenance of Way Department's Place in Railroading*

By COL. F. W. GREEN
Vice-President, St. Louis Southwestern, St. Louis, Mo.

IN THE YEAR 1926, the maintenance of way department of the St. Louis Southwestern lines expended $4,864,847, which means that out of every dollar earned that year, 19 cents was spent by the maintenance of way department. These figures show that this department is one of the most important in the entire railroad. With so large a proportion of the company's revenues expended for maintenance of way and structures, it is very important that extraordinary care be taken to see that none of these revenues are dissipated wastefully. Even so small a reduction as 10 per cent in the cost of maintenance of way and structures would produce the large saving of $486,485 in the course of a year's time, which would then be available for useful and profitable purposes. From what I have observed from time to time on the road, I do not think it would be at all difficult to save this 10 per cent.

I have always considered maintenance of way foremen, whether section or extra gang, as among the most important members in our organization. A little care here and there on their part, from hour to hour and from day to day, is certain to be reflected in better service and lower costs. Some men have the mistaken idea that when they waste their employer's money they do themselves no harm. Nothing could be farther from the truth. In our highly complex life today, every man who fails to contribute at least as much to the welfare of society as society contributes to him, is just as much a burden on the community, in the last analysis, as if he were living upon community charity as an inmate of a community poor farm. On the other hand, the measure of every man's usefulness to his community is the excess value of his contribution to the community over and above what the community contributes to him. This may seem to be somewhat abstruse economic discussion, but I consider it extremely important, because no man will be wasteful of either his own, or his employer's, or his neighbor's substance, once he realizes the fact that he is damaging everybody, including himself, and helping no one, not even himself, by such wasteful practices.

### The Test of a Man's Value

An apt illustration of this important principle is a comparison of a man like Thomas A. Edison with a tramp. Consider what Edison has done for the world by the invention of the electric light, the phonograph, the moving pictures, the improvements in the telephone, telegraph, storage battery and a long list of inventions, all of which have contributed immensely to the wealth of the world, and to the welfare of the people! On the other hand, consider the vagabond. He will not work, but he expects to be fed, lodged and clothed by the work of other people. He contributes nothing to community welfare and takes from the community infinitely more than he gives, while men like Edison give to the community infinitely more than they receive.

Think these things over before you take out a cross tie a year before it ought to come out; before setting fire to grass on the right of way without taking steps to prevent fence posts and telegraph poles from burning; before passing open farm gates, with stock upon, or about to get upon, the right of way; and before

* An abstract of an address delivered before the sixth annual meeting of the Maintenance of Way and Sanitary Engineering Departments of the St. Louis-Southwestern at Paragould, Ark., on March 24, 1927.

letting your men loiter and kill time at the company's expense. This company has conscientiously endeavored to treat all of its employees with justice and consideration. It has done this in the hope that its employees, when so treated, would treat the management with justice and consideration. The management hopes that it has not been mistaken in this. It has been and is furnishing the very best grades of materials for the maintenance of way and structures. It hopes and believes that its employees will keep in mind the fact that this material is costly and valuable and obtained after considerable sacrifice by the owners of the company. It does not feel that it is asking anything unreasonable, therefore, in requesting that this material be conserved and treated with as much care and consideration as a careful, prudent and efficient man would give his own property of equal money value.

Nothing is more discouraging to a railway officer than to find material scattered all around, instead of being neatly assembled. When he finds such conditions, they say to him just as plainly as if a large sign had been erected over the toolhouse: "The foreman on this section is shiftless, indifferent and incompetent. He is a stickler for his rights but not at all worried about his responsibilities. As long as he remains on the payroll he will continue to receive compensation but never to render service." I am very happy to say that there are fewer and fewer evidences of this character on our road, and I look forward with confidence to the time when every foreman in the maintenance of way department will be proud to be in the service of this company and this company equally proud of having him in its service.

I want to point out the very intimate effect which efficiency in maintenance of way matters has upon the efficiency of other departments. If the track is well maintained, so that slow orders are unnecessary, there will be savings in transportation costs by reductions in the cost of fuel, wages and, to a lesser extent, in other items of transportation expense. There will be savings in the cost of maintenance of locomotives and cars. There should be fewer broken frames, fewer broken driving springs on locomotives and truck springs and draft gear on locomotives and cars. By the avoidance of delays due to slow orders, derailments, etc., the freight claim department is benefited by the reduction in freight claims, and the traffic department benefited by being able to obtain business routed over our line which might otherwise be routed against us, in case previous shipments routed over our line had been delayed from these causes. The traffic department also receives very large benefits from increased patronage when shippers, riding over the road on passenger trains, find the track smooth, the trains punctual, and the track and buildings neat and orderly. The hospital department benefits by fewer casualties, the law and claim departments have fewer claims to settle for personal injuries, and the store department has less material to buy to replace that damaged and destroyed in accidents before having reached the end of its useful life.

With our mistakes behind us and our hopes before us, let us resolve in the coming year to go forward together, with a will to achieve safe, efficient, economical and creditable maintenance of way and structures.

## The Section Foreman and Safety*

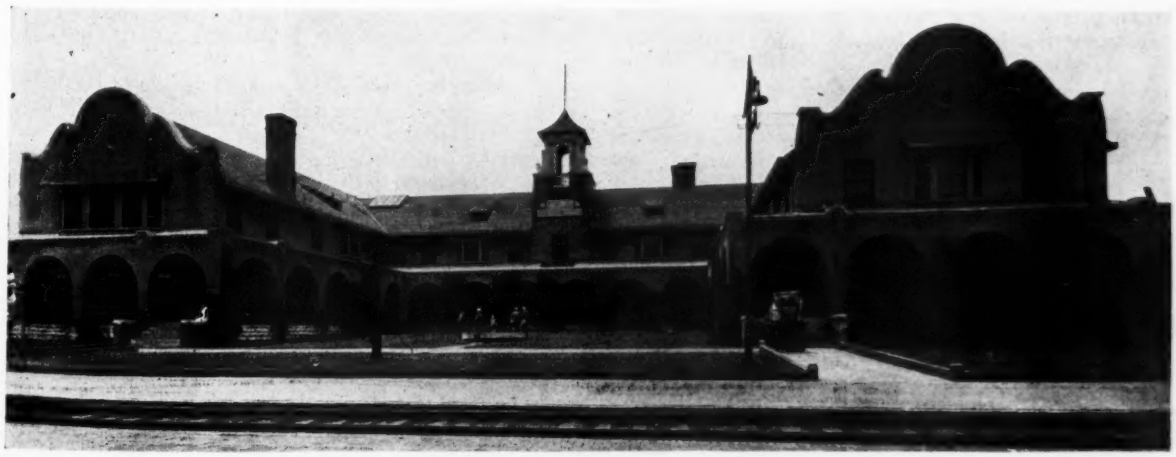
By J. W. Littell

Section Foreman, St. Louis Southwestern, Paragould, Ark.

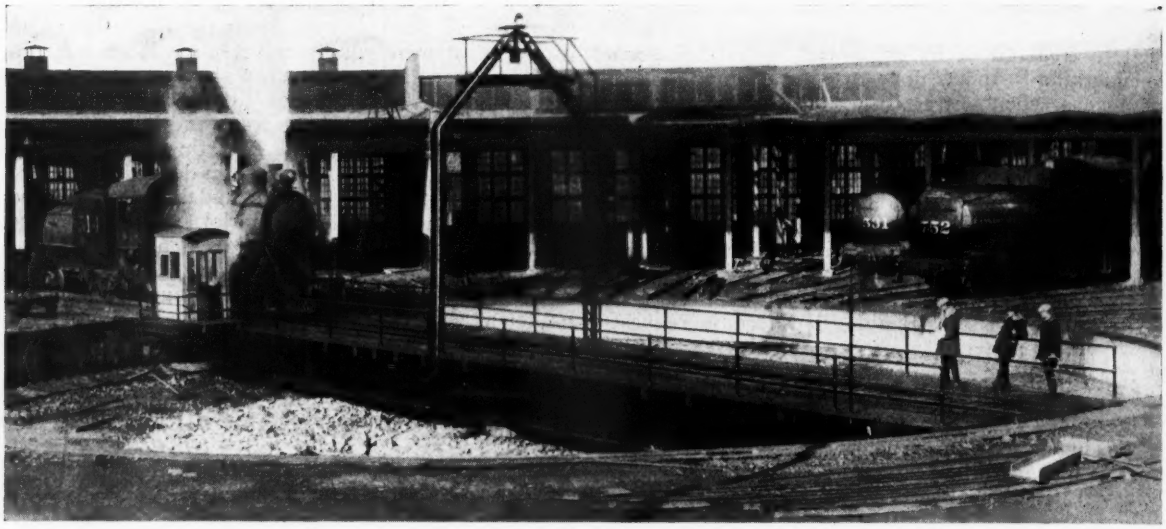
SECTION foremen can do a great deal in reducing the number of accidents by the safe operation of their motor, hand, or velocipede cars for there are so many little things, such as loose nuts or rivets, exposed flywheels, cog wheels, belts, pulleys, etc., which have caused serious accidents. Just a little thought is the greatest requirement. We cannot say it takes too much time to make these repairs nor can we offer the excuse that the expense is too great. As I see it, it is neglect—the lack of a thought that would save money, suffering and perhaps life itself. The men who are working under us are looking to us for their safety, their families are looking to us for their safety; and the company is demanding of us their safety. Surely it is worth thinking about.

When we start to work in the morning we naturally see to it, as a part of our duty, that we have the proper tools and materials for the day's work. Then we ask ourselves—"Are we ready to go?" It seems to me the question would be more complete if we would add: "And are we safe to go?" That would cause us to inquire of ourselves if there was anything wrong with our own car and to be sure that the tools and material were placed properly. If we had a busy street to cross or a sharp curve to approach, it would cause us at least to heed the rules of safety.

* Abstracted from a paper presented at the sixth annual meeting of the Maintenance of Way and Sanitary Engineering Departments of the St. Louis Southwestern at Paragould, Ark., on March 24, 1927.



The Castaneda Hotel on the Santa Fe at Las Vegas, N. M.



*The New Twin Span Turntable at Heavener, Okla.*

# Kansas City Southern Makes Short Job of Replacing Turntable

## Old Balanced Type Structure Is Removed and New Twin Span Structure Installed in Less Than Three Hours

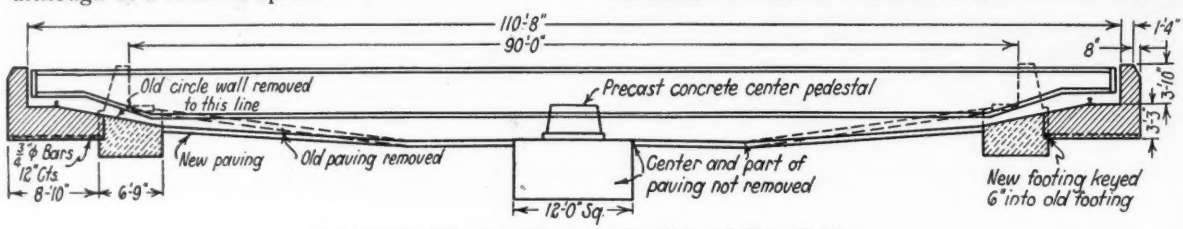
A 110-ft. Bethlehem twin span turntable was installed by the Kansas City Southern at Heavener, Okla., on November 30, 1926, replacing a 90-ft. balanced type turntable, in the short time of 2 hr. and 54 min., from the time the old table was taken out of service until an engine was turned on the new turntable.

The new structure is an end bearing type turntable, the main girders being supported by a cross girder at the center with a slightly flexible connection so that the table acts as two independent simple girder spans. The turning center is of the disc type and is set under the cross girders. The outer ends of the main girders are supported by the end trucks which run on a 130-lb. circle rail, these trucks taking both dead and live load reactions. Engines can be turned when placed on any part of the table, it being unnecessary to balance the load, and the end trucks are equipped with Hyatt roller bearings which reduce the friction in a marked degree. There is a tractor at each end of the turntable, driven by a 15-hp. electric motor, both of which are operated from one control in the operator's cabin. Provision is made for operating by a single motor in case of emergency, since either motor is capable of operating the table, although at a reduced speed.

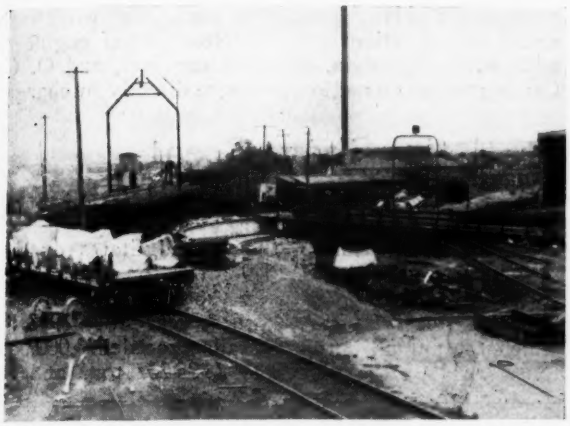
The quick time in changing the table was made possible by advance preparations and a preliminary study of handling the various operations without loss of time and without interference. As the new table is 20 ft. longer than the old, it was possible to build a new circle wall and install the new circle rail without interfering with the operation of the old table. The new wall was built in sections, the old wall removed and the tracks carried over the 10 ft. space between the new wall and the end of the old turntable on timbers which could be removed quickly.

The new table is designed for heavier loading than the old, but the load on the center pier is less than was imposed by the old table, because part of the load is carried by the end trucks. The old center pier therefore was used for supporting the new turntable, but to suit the new construction, it was necessary to build up this center pier by placing a large pre-cast pedestal.

Fortunately, there was space alongside of the turntable pit opposite the roundhouse to assemble the new turntable completely. The new table was set up and riveted with the end trucks and deck, including the rails, in place and the wiring completed except, of course, connecting the main feed wire. The table was assembled so that it could be moved on car trucks



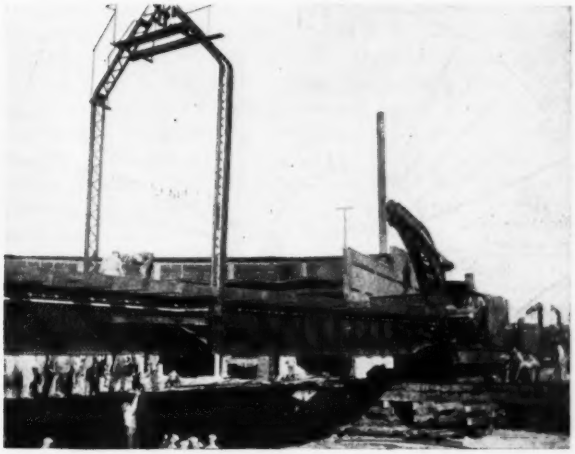

**Longitudinal Section Through the Old and New Tables**



The New Table Was Assembled Complete Alongside the Turntable Pit

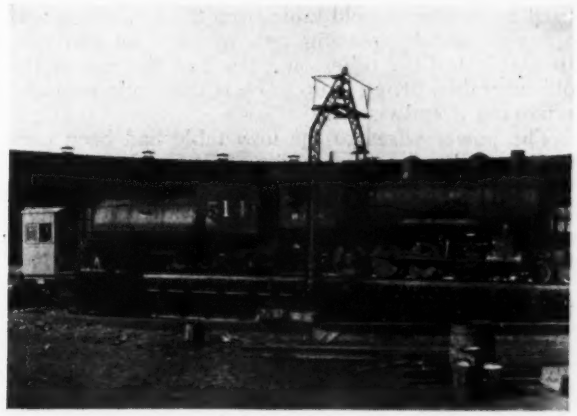
The Old Table Was Lifted Off the Center and Set to One Side in the Pit

The New Table Was Moved Over the Pit on a Temporary Track Built Along Each Side



The New Table Was Lowered in Place by Locomotive Cranes Placed at Each End

The Old Table Was Removed Endwise from the Pit by the Locomotive Cranes



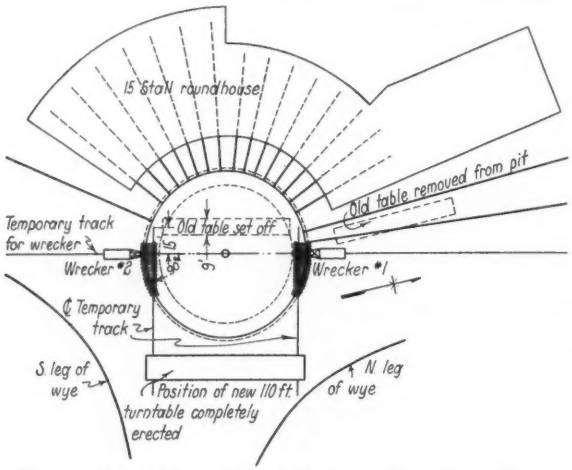
The Change Was Completed and the First Engine Turned in Less than Three Hours

Successive Steps in the Replacement of a 90-ft. Turntable by a 110-ft. Turntable at Heavener, Okla.

placed under the ends, on a temporary track to a position directly over its final location.

The work of removing the old table and setting in the new table was handled with two 120-ton wrecking cranes placed one at each end of the pit. The five-ton concrete pedestal was first lowered into the pit alongside of the old table so that it could be moved into place on rollers, then the old table was lifted by the wreckers and set in the pit so that it would clear the position of the new turntable. The next operation was to dress off the center pier and set the new concrete pedestal. While this was being done the temporary tracks to move the new table in position were completed and the old circle rail and some of the concrete supporting it was removed.

The new table was then moved on the temporary track to a position immediately over its final location, raised by wrecking cranes and lowered into position after removing the car trucks and that part of the temporary track which came inside of the turntable pit. This type of table is not designed to resist bending at the middle; therefore in order to lift it from the two ends, temporary splice plates were




**Plan of Turntable and Enginehouse at Heavener, Okla.**

bolted on the flanges of the track girders to provide the necessary continuity. The wreckers were then used to remove the old table from the pit, which was accomplished by placing one wrecker on the new turntable and the other on a track at the end of the old turntable, lifting it up to clear the circle wall and removing it endwise.

The power wires to the new table had been connected in the meantime and as soon as the old table was out of the pit an engine was run on the new turntable and turned a complete circle, 2 hr. and 54 min. after the last engine had been turned by the old turntable.

The chronological order of the operation was as follows:

| | |
|---|---|
| 9:23 a. m. | Old table taken out of service. |
| 9:25 a. m. | Power wires cut. |
| 9:37 a. m. | Old table picked up. |
| 9:50 a. m. | Old table landed in the clear, 15 ft. west. |
| 9:55 a. m. | Started dismantling deck of the old table. |
| 11:14 a. m. | Center pedestal ready for the new turntable. |
| 11:32 a. m. | New turntable in position on center. |
| 11:35 a. m. | Wrecking crane moved across the new turntable. |
| 11:53 a. m. | Started taking old table out of the pit. |
| 12:15 p. m. | Old table out of pit, engine No. 514 moved on the new turntable. |
| 12:17 p. m. | New turntable in service, engine No. 514 having completed a full circle turn. |

The work was done by the railway company's forces consisting of 68 men, including a bridge and building gang of 50 men; 2 wrecker crews of 5 men each, and a section gang of 8 men. The work was under the direction of A. N. Reece, chief engineer, with A. E. Willahan, assistant engineer, and O. C. Carrington, construction foreman, directly in charge.

# Statistics Show Great Gain in Rail Output

RAIL production in the United States during 1926 totaled 3,217,649 gross tons, according to statistics issued by the American Iron & Steel Institute. This is the first year since 1913 in which the annual output of rails exceeded 3,000,000 tons. In 1925 the total was 2,785,257 tons and in 1924 only 2,433,332 tons. Of the 432,392 tons by which the production for 1926 exceeded that for 1925, 329,809 tons represents the increase in the production of rails weighing 100 lb. or more per yard. In fact, the output of these heavy sections during 1926, 1,966,440 tons, was greater than the total tonnage of all weights of rail produced in 1914. Expressed in

**Production of Rails by Weight Per Yard, 1910-1926**

| Years | Under 45 pounds | 45 and less than 85 | 85 and less than 100 | 100 pounds and over | Total gross tons |
|---|---|---|---|---|---|
| 1910 | 260,709 | 1,275,339 | 2,099,983 | | 3,636,031 |
| 1911 | 218,758 | 1,067,696 | 1,536,336 | | 2,822,790 |
| 1912 | 248,672 | 1,118,592 | 1,960,651 | | 3,327,915 |
| 1913 | *270,405 | †967,313 | 2,265,062 | | 3,502,780 |
| 1914 | *238,423 | †309,865 | 868,104 | 528,703 | 1,945,095 |
| 1915 | *254,101 | †518,291 | 742,816 | 688,995 | 2,204,203 |
| 1916 | *295,535 | †566,791 | 1,225,341 | 766,851 | 2,854,518 |
| 1917 | *308,258 | †882,673 | 989,704 | 763,526 | 2,944,161 |
| 1918 | *395,124 | †665,165 | 888,141 | 592,462 | 2,540,892 |
| 1919 | *263,803 | †495,577 | 965,571 | 478,892 | 2,203,843 |
| 1920 | *489,043 | †433,333 | 952,622 | 729,118 | 2,604,116 |
| 1921 | *211,568 | †214,936 | 902,748 | 849,566 | 2,178,818 |
| 1922 | *265,541 | †274,731 | 728,604 | 902,900 | 2,171,776 |
| 1923 | *272,794 | †300,907 | 864,965 | 1,465,850 | 2,904,516 |
| 1924 | *191,046 | †213,274 | 853,431 | 1,175,581 | 2,433,332 |
| 1925 | *163,607 | †219,648 | 765,371 | 1,636,631 | 2,785,257 |
| 1926 | *197,260 | †256,287 | 797,662 | 1,966,440 | 3,217,649 |

* Includes rails under 50 pounds. † Includes 50 pounds and less than 85 pounds.

**Production of Alloy-Treated Steel Rails, 1917-1926**

| Years | Total production Gross tons | Production by alloys: Titanium | Production by alloys: Other alloys | Production by processes: Open hearth and elect | Production by processes: Bessemer | Production by weight per yard: Under 50 lbs. | Production by weight per yard: 50 and under 85 lbs. | Production by weight per yard: 85 and under 100 lbs. | Production by weight per yard: 100 lbs. and over |
|---|---|---|---|---|---|---|---|---|---|
| 1917 | 16,535 | 15,273 | 1,262 | 16,535 | .... | .... | 335 | 6,671 | 9,529 |
| 1918 | 3,111 | 2,891 | 220 | 3,111 | .... | .... | 47 | 2,640 | 424 |
| 1919 | 6,476 | 6,207 | 269 | 6,476 | .... | .... | .... | 3,920 | 2,556 |
| 1920 | 12,909 | 11,652 | 1,257 | 12,909 | .... | .... | 514 | 5,069 | 7,326 |
| 1921 | 6,276 | 2,804 | 3,472 | 6,276 | .... | .... | 71 | 4,277 | 1,928 |
| 1922 | 3,163 | 2,493 | 670 | 3,163 | .... | .... | 321 | 835 | 2,007 |
| 1923 | 2,142 | 346 | 1,796 | 2,142 | .... | .... | 56 | 317 | 1,769 |
| 1924 | 5,167 | 1,696 | 3,471 | 5,167 | .... | .... | .... | 847 | 4,320 |
| 1925 | 4,009 | 1,616 | 2,393 | 4,009 | .... | 70 | 47 | .... | 3,892 |
| 1926 | 16,371 | 1,099 | 15,272* | 16,371 | .... | .... | 42 | 3,072 | 13,257 |

* Included 15,191 tons of manganese steel and 81 tons of copper steel.

**Production of Rails by Processes, Gross Tons, 1911-1926**

| Years | Open-hearth | Bessemer | Rerolled* | Electric Iron | Total |
|---|---|---|---|---|---|
| 1911 | 1,676,923 | 1,053,420 | 91,751 | 462 234 | 2,822,790 |
| 1912 | 2,106,144 | 1,090,926 | 119,390 | 3,455 ..... | 3,327,915 |
| 1913 | 2,527,710 | 817,591 | 155,043 | 2,436 ..... | 3,502,780 |
| 1914 | 1,525,851 | 323,897 | 95,169 | 178 ..... | 1,945,095 |
| 1915 | 1,775,168 | 326,952 | 102,083 | ..... ..... | 2,204,203 |
| 1916 | 2,269,600 | 440,092 | 144,826 | ..... ..... | 2,854,518 |
| 1917 | 2,292,197 | 533,325 | 118,639 | ..... ..... | 2,944,161 |
| 1918 | 1,945,443 | 494,193 | 101,256 | ..... ..... | 2,540,892 |
| 1919 | 1,893,250 | 214,121 | 96,422 | 50 ..... | 2,203,843 |
| 1920 | 2,334,222 | 142,899 | 126,698 | 297 ..... | 2,604,116 |
| 1921 | 2,027,215 | 55,559 | 96,039 | 5 ..... | 2,178,818 |
| 1922 | 2,033,000 | 22,317 | 116,459 | ..... ..... | 2,171,776 |
| 1923 | 2,738,779 | 25,887 | 139,742 | ..... ..... | 2,904,516 |
| 1924 | 2,307,533 | 16,069 | 109,730 | ..... ..... | 2,433,332 |
| 1925 | 2,691,823 | 9,687 | 83,747 | ..... ..... | 2,785,257 |
| 1926 | 3,107,992 | 12,533 | 97,124 | ..... ..... | 3,217,649 |

* Rerolled from old steel rails.

percentages, the output of the heavy rails represented 61.2 per cent of the total in 1926, as compared with 58.8 per cent in 1925, 49.3 per cent in 1924 and 26.9 per cent in 1916.

Bessemer rails were produced in 1926 to a total of 12,533 tons as compared with 9,687 tons in 1925. But as only 1,169 tons of Bessemer steel was rolled into sections weighing 85 lb. per yd. or more, this material is no longer of any significance insofar as the railroads are concerned. There was a marked increase during 1926 in the production of alloy-treated rail, which totaled 16,371 tons. This figure compares with 4,009 tons of these special rails produced in 1925 but is slightly less than the total in 1917. However, in comparing the operations of 1926 and 1917 in this special field of rail manufacture it is of interest to note that out of 16,535 tons of special-steel rails rolled in 1917, 15,273 tons represented tatanium steel whereas with very nearly the same total of alloy steels in 1926, the larger proportion or 15,191 tons was manganese steel, while titanium steel comprised only 1,099 tons.

# Maintenance of Way Forces Concerned in Many Railway Accidents

A TOTAL of 6,766 persons were killed and 137,435 others injured in railway accidents in the United States in 1925, according to Accident Bulletin No. 94, issued by the Interstate Commerce Commission. As in the past, maintenance of way forces figured largely in the accidents, both in the number of persons killed and injured and in the responsibility for the accidents themselves. Maintenance employees on duty to the number of 469 were killed and 27,393 were injured, accounting for 31 per cent of the deaths and 23 per cent of the injuries sustained by employees on duty. By far the greatest number of casualties occurred on the Class I roads, which constitute about 90 per cent of the mileage of the country and the following tabulation shows the casualties sustained by the different classes of maintenance employees on these roads.

**Casualties to Maintenance of Way Employees**

| Class of Labor | Train, train service and non-train accidents | | Nontrain accidents | |
|---|---|---|---|---|
| | Killed | Injured | Killed | Injured |
| Roadmasters, general foremen and inspectors | 10 | 110 | 7 | 90 |
| Section or extra gang foremen | 49 | 1,151 | 15 | 1,061 |
| Section and extra gang laborers | 270 | 18,862 | 42 | 18,108 |
| Other m. of w. laborers | 19 | 932 | 12 | 917 |
| B. and B. foremen | 3 | 221 | 3 | 209 |
| B. and B. carpenters | 31 | 2,368 | 21 | 2,339 |
| B. and B. ironworkers, painters, masons, etc. | 15 | 418 | 7 | 406 |
| B. and B. helpers and apprentices | 5 | 676 | 4 | 665 |
| Portable steam equipment operators | 10 | 209 | 8 | 183 |
| Pumpers | 3 | 128 | 3 | 125 |
| Signal and telegraph foremen | 3 | 37 | 1 | 36 |
| Signal and telegraph maintainers and helpers | 33 | 1,049 | 13 | 1,004 |
| Total | 451 | 26,161 | 136 | 25,143 |

From this it will be noted that while 315 or 70 per cent of the accidental deaths among the maintenance forces were due to train and train service accidents, the greatest number of injuries, 25,143 out of a total of 26,161 or 96 per cent, were due to nontrain accidents. Track laborers sustained the heaviest casualties, with 270 deaths and 18,862 injuries or 60 per cent and 72 per cent respectively of the total deaths and injuries. Bridge and building carpenters were next in point of casualties with 31 deaths and 2,368 injuries. A further study of the report shows that 9 deaths and 10,550 injuries or almost half the total nontrain casualties to employees were sustained in handling rails, ties, bridge timbers, etc., and that nontrain accidents involving hand cars and motor cars accounted for 54 deaths and 4,067 injuries on the Class I roads.

Of the 20,785 train accidents in 1925, 3,263, or approximately 16 per cent, were caused by defects in or improper maintenance of way and structures, these latter accidents resulting in a total of 41 deaths and 665 injuries to persons, and entailing a property loss to the railroads of $3,437,236. Four of the accidents were collisions caused by defects in the signal systems and three were collisions due to other maintenance of way defects while the others were derailments. The following tabulation shows the causes of accidents which were due to the failure to maintain tracks and structures properly:

**Accidents Due to Defective Tracks, Etc.**

| Causes | Accidents | Killed | Injured |
|---|---|---|---|
| Bridges, trestles, culverts and tunnels, defects in structures or maintenance | 10 | ---- | 4 |
| Ties and tie plates | 427 | 1 | 1 |
| Rails and fastenings | 1,052 | 25 | 425 |
| Frogs and switches | 563 | 12 | 79 |
| Interlocking and block signaling, improper indications and improper maintenance | 4 | ---- | 7 |
| Tracks, improper line, surface and gage | 1,207 | 3 | 149 |
| Total | 3,263 | 41 | 665 |

Broken rails were responsible for 650 accidents or 20 per cent of the total as well as for 60 per cent of both the deaths and injuries resulting from accidents due to improper maintenance of way. Improper line and surface, including the improper superelevation of curves caused 736 accidents or 22.6 per cent of the total, while 13 per cent of the total were caused by decayed or otherwise poor ties.

**Causes of Accidents Classified**

| Cause | Accidents | Killed | Injured |
|---|---|---|---|
| Negligence of employees, failure to put out slow flags | 21 | 4 | 83 |
| Due to combination of faulty maintenance and faulty maintenance of equipment | 175 | 1 | 2 |
| Due to fire, floods, snow or landslides or other accidental obstructions | 217 | 63 | 201 |
| Due to malicious acts | 79 | 6 | 63 |
| Total | 492 | 74 | 249 |

Other train accidents in which the maintenance of way department was directly or indirectly involved totaled 492 with 74 deaths and 349 injuries. These

accidents may be classified as man failures, as in the negligence of employees to put out the proper slow flags; those due to a combination of poorly maintained equipment and roadway; unforeseen, as those caused by fire, floods, snow or landslides; and lastly those due to malicious acts. Accidents from these various causes are shown in the last table on page 207.

Other accidents in which the maintenance of way forces were interested, and in some of which they may have been wholly or in part to blame are those arising from persons on moving cars or locomotives coming in contact with fixed structures along the track. The accidents from this cause, classified as to the type of structure, are shown in the following table:

**"Limited Clearance" Accidents Classified**

| Cause | Killed | Injured |
|---|---|---|
| Bridges, overhead and side members | 33 | 157 |
| Buildings or gates, not otherwise provided for | 2 | 54 |
| Coal chutes, aprons, docks, elevators, etc. | 1 | 23 |
| Enginehouse walls, doors or doorways | .... | 6 |
| Fences, cattle guards, etc. | 3 | 29 |
| Mail cranes, in position for mail delivery | 3 | 31 |
| Overhang at stations or other buildings | .... | 20 |
| Platforms | 4 | 43 |
| Poles | .... | 67 |
| Scale housings | .... | 12 |
| Signal arms or other parts of signal apparatus | .... | 19 |
| Stock chutes or pens | .... | 13 |
| Switch stands, lamps, targets, etc. | 4 | 140 |
| Tunnels and snowsheds | 4 | 6 |
| Warning guards or ticklers | .... | 4 |
| Water and fuel-oil standpipes and spouts | 3 | 54 |
| Wires or pipes, overhead | 1 | 59 |
| Other fixed structures | 3 | 61 |
| | 61 | 798 |

### Many Accidents Were Caused by Tripping Over Refuse

Accidents to persons getting on or off of locomotives or cars were the cause of many casualties, among which may be cited 4 deaths and 187 injuries, occasioned by coming in contact with fixed structures, 2 deaths and 1,647 injuries due to tripping on coal, boards, stone, rubbish or other loose or refuse material or in holes, 10 injuries due to slipping on defective station platforms and 1 death and 39 injuries caused by coming in contact with temporary or movable structures. Most of these casualties were sustained by employees in train service. In similar accidents to persons not engaged in getting on or off of cars and locomotives, chiefly employees in the train service, 3 were killed and 43 were injured by being caught between locomotives or cars and fixed structures, 1 was killed and 1,083 were injured by stepping or tripping on coal, boards, rails, ties, rubbish or other loose or refuse material, or in holes, 165 were injured by tripping over air or steam lines, switch rods or levers, signal wires, etc., 46 were injured by falling into turntable, ash or inspection pits, 4 were killed and 414 were injured by falling off or through bridges and trestles not equipped with handrails or footwalks, and 2 were killed and 4 injured by falling off or through bridges and trestles which were provided with handrails or footwalks.

Hand cars or motor cars struck by locomotives or cars caused 47 deaths and 161 injuries, of which 36 deaths and 125 injuries were sustained by employees on duty, aside from train service, while 8 employees were killed and 1,067 were injured in non-train accidents in which handcars were involved and 53 were killed and 3,226 were injured by similar accidents in which motor cars figured.

# Fluctuations in Maintenance Forces on Large Roads

THE EXTENT of the fluctuations between the maximum and minimum forces engaged in the maintenance of way and structures on the large railroads of the country, as well as the variation of these fluctuations between individual roads, is shown in a statement issued by the Interstate Commerce Commission, giving data for 20 of the leading systems for the calendar year 1926. In this statement the forces in the months of the largest and smallest employment are expressed in percentages of the average annual employment and are on the basis of hours per working day rather than on the actual number of employees.

| Name of System | Maximum (per cent) | Minimum (per cent) | Difference (per cent) |
|---|---|---|---|
| Pennsylvania | 110.2 | 88.2 | 22.0 |
| New York Central | 118.6 | 78.4 | 40.2 |
| New York, New Haven & Hartford | 115.0 | 74.8 | 40.2 |
| Erie | 111.1 | 86.6 | 24.5 |
| Baltimore & Ohio | 133.1 | 71.9 | 61.2 |
| Chesapeake & Ohio | 109.8 | 82.1 | 27.7 |
| Norfolk & Western | 119.9 | 78.4 | 41.5 |
| Atlantic Coast Line | 107.5 | 91.0 | 16.5 |
| Southern | 108.6 | 92.0 | 16.6 |
| Illinois Central | 113.3 | 85.1 | 28.2 |
| Missouri Pacific | 111.0 | 92.9 | 18.1 |
| Southern Pacific | 111.0 | 89.1 | 21.9 |
| Atchison, Topeka & Santa Fe | 118.2 | 73.3 | 44.9 |
| Chicago, Rock Island & Pacific | 116.6 | 84.8 | 31.8 |
| Chicago, Burlington & Quincy | 123.6 | 60.5 | 63.1 |
| Chicago & North Western | 132.3 | 65.0 | 67.3 |
| Chicago, Milwaukee & St. Paul | 134.2 | 61.4 | 72.8 |
| Union Pacific | 124.0 | 76.4 | 47.6 |
| Northern Pacific | 129.3 | 72.1 | 57.2 |
| Great Northern | 137.5 | 60.3 | 77.2 |

As might be expected the southern roads show the smallest fluctuations, either for individual roads or collectively, but there are wide variations among the northern roads, even for those traversing the same general territory. Thus it will be noted that on the Pennsylvania the range is from a minimum of 88.2 per cent to a maximum of 110.2 per cent, or a spread of 22 per cent, while the New York Central, with approximately the same mileage and located in much the same geographical area, has a range from a minimum of 78.4 per cent to a maximum of 118.6 per cent, with a spread of 40.2 per cent, almost twice as great as that on the Pennsylvania. Similarly, of the extreme northwesterly roads, the Northern Pacific has a range of 57.2 per cent as compared with 77.2 per cent on the Great Northern, the latter being the greatest spread for any of the large systems.

It will be seen also that the divergences from the average annual employment on individual roads are approximately equal in most cases but there are some exceptions to this, notably on the Burlington where the minimum is 60.5 per cent, or 39.5 per cent below the average employment, while the maximum is but 23.6 per cent above the average. Of the roads listed, only two have lower minimums than the Burlington: the Chicago, Milwaukee & St. Paul, with 60.4 per cent and the Great Northern, with 60.3 per cent. On the latter road, which has both the highest maximum and the lowest minimum percentage the divergences are approximately equal, being 37.5 and 39.7 per cent, respectively.

*Illinois Central Water Treating Plant at Sioux City, Iowa*

# Cutting the Cost of Water Treatment $2.27 per 100,000 Gal.

## Illinois Central Reduces Expense at New Plant by Recovering Filter Wash Water and Curbing Loss in Sludging

By C. R. KNOWLES

Superintendent of Water Service, Illinois Central, Chicago

THE water treating plant recently constructed in connection with the Illinois Central mechanical terminal at Sioux City, Iowa, embodies a number of unique features of chemical tank design, filter housing and provisions for conserving the water used in washing the filters and removing the sludge from the settling tank. The general design of the plant follows closely the Illinois Central standard plans for water treating plants. The building is 22 ft. by 50 ft. over all, divided into two rooms, one being used for the treating plant machinery and the other for the storage of chemicals. The operating room is 20 ft. by 22 ft. and the storage room 22 ft. by 30 ft., providing sufficient space for the storage of one car each of lime and soda ash.

The treating tank is a standard 100,000 gal. capacity conical bottom steel tank, 22 ft. in diameter and 50 ft. high with a sludge drum 6 ft. in diameter and 11 ft. high. The downcomer is 6 ft. in diameter and extends 5 ft. above the top of the tank. Agitation and mixture of the chemicals and the incoming water are accomplished by vertical and horizontal baffles located in the top 5 ft. of the downcomer. The proportioning of the chemicals is accomplished by a proportioning valve located at the top of the downcomer, all of which is housed in a frame head house 10 ft. by 10 ft. with an 8 ft. ceiling. The head house is of the same type of construction as the treating plant house and is heated by steam. The steam pipes as well as the chemical lines pass to the top of the tank alongside the ladder of the tank, which is completely enclosed.

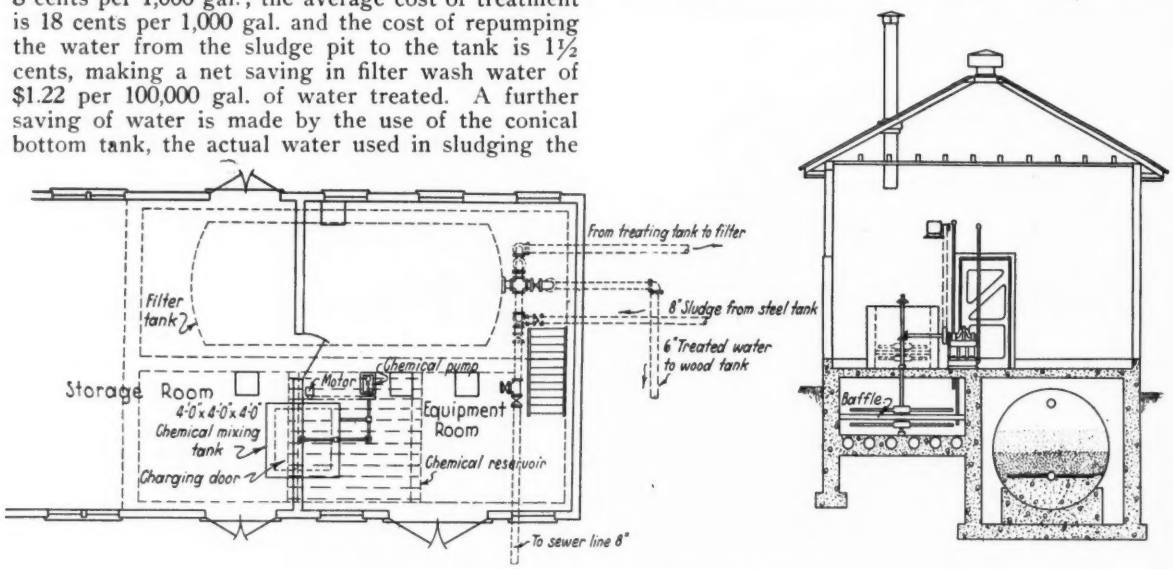
The treated water is drawn off the top of the treating tank through a 12-in. by 12-in. steel trough extending across the top of tank, thus avoiding any possibility of "short-circuiting" the water, as it must enter the trough in a thin sheet throughout its length. From the trough the water is taken through an 8-in. pipe line to the filter from which it passes to the roadside tank. The top of the treating tank is eight feet higher than the roadside tank, which is sufficient to overcome the loss of head through the filter bed, thus avoiding any repumping, as the water flows by gravity from the treating tank through the filter and to the roadside tank.

The location for the plant was in a depression, making it necessary to bring the foundations about eight feet above the ground level. Advantage was taken of this in designing the house and a basement was constructed in part of the space between the foundation walls. The filter is located in this basement, thus permitting a reduction in the size of the house as otherwise it would have been necessary to provide additional room in order to place the filter on the operating floor. The remainder of the space between the foundation walls is utilized for the chemical control tank and a sludge pit, both of which are placed below the floor level and are constructed of reinforced concrete, the foundation walls forming the walls of the sludge pit with the chemical tank in the

center of the sludge basin and immediately below the batch tank. The filter is of the closed pressure type having a capacity of 20,000 gal. per hour at a rate of two gallons per minute per square foot of filter area. All water used in washing the filter is discharged into the sludge pit and is repumped to the downcomer, thus saving 5,000 gal. of water for every 100,000 gal. of water treated.

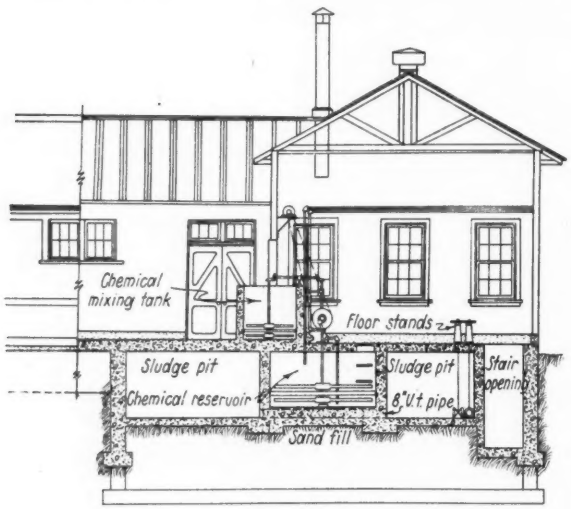
Water is purchased from the city at the rate of 8 cents per 1,000 gal.; the average cost of treatment is 18 cents per 1,000 gal. and the cost of repumping the water from the sludge pit to the tank is 1½ cents, making a net saving in filter wash water of $1.22 per 100,000 gal. of water treated. A further saving of water is made by the use of the conical bottom tank, the actual water used in sludging the tank being 700 gal. for every 100,000 gal. treated. Tests of flat bottom tanks of the same diameter show that effective sludging requires from 5,000 to 7,000 gal. of wash water per 100,000 gal. treated, thus, even at the lower figure the conical bottom tank is saving 4,300 gal. per 100,000 gal. or $1.05, making a total saving in at this plant of $2.27 per 100,000 gal.

Two tanks are provided for the chemical solutions. A reinforced concrete batch tank is built in the wall between the operating room and the chemical storage, thus permitting it to be charged with chemicals direct from the chemical storage room and avoiding the usual dirt and dust where tanks are charged from the operating room. This batch tank has a capacity of chemical solution sufficient for eight hours' run, and after being mixed in this tank the solution is discharged into the control tank under the floor which will hold three batches or enough for a 24-hour run at the full capacity of the plant. Both chemical tanks are provided with mechanical agitation, driven by a slow speed motor which also operates the chemical pump. The agitators are driven by means of bevel gears and vertical shafts and the pumps by a belt.




**Plan and Transverse Section of Treating Plant**

The entire plant is heated by steam from the power house at the mechanical plant and is electric lighted throughout. The water treated has a total of 29 grains hardness, 7 of which are sulphates and 21 carbonates. An average of 100,000 gal. is treated daily, which permits all treatment to be carried out in eight hours with a minimum of labor. The plant was constructed by Jos. E. Nelson & Sons, Chicago, under the direction of the Illinois Central.




**Longitudinal Section of Treating Plant**

**West Portal of the Stampede Tunnel Through Which the Northern Pacific Crosses Under the Backbone of the Cascade Range**

# Tie Scoring Machine Saves Labor on the D. L. & W.

## New Unit, Which is a Marked Improvement Over 1925 Model, Establishes Impressive Record During 1926

A NUMBER of important improvements have been made during the last year in the tie scoring machine which has been in process of development on the Delaware, Lackawanna & Western for some time. This machine, which was designed and has been developed by A. J. Neafie, principal assistant engineer of the Lackawanna, is a self-contained tie scoring plant mounted on a steel frame push car and so arranged that the ties in the track

**The Machine Is Drawn by a Heavy-Duty Motor Car**

can be scored to any desired depth on both sides of each rail at the same time. This makes it possible to secure accurate adzing and the correct amount of it as regards each tie, on a horizontal plane or on any desired angle of inclination.

### Machine is Simple in Design and Contruction

The machine itself, which is radically different in many respects from the design used during 1925 on the Lackawanna and described in the July, 1925 issue of Railway Engineering and Maintenance, consists essentially of a push car, four power-driven circular saws, saw adjusting and locking devices and a gasoline-driven power unit. The saws of the machine, which are 26 in. in diameter, operate in pairs; one pair being mounted on a shaft just ahead of the rear axle of the car and spaced so as to score the ties outside of the rails or tie plates, while the other pair is mounted on the ends of a similar shaft just behind the front axle of the car and so spaced as to score the ties the proper distance inside of the rails or tie plates. In each case these shafts are supported at each end within a guide box which permits the saws to be raised or lowered as desired, this movement being controlled by four adjusting screws by means of which the saws can be set for any desired depth of scoring.

The saws used with the machine are of crucible steel and are secured to the ends of the shafts by large nuts. In each case the saws are well protected by stout metal guards to prevent injury to those who may be about the machine. Power for the operation of the saws is furnished by a 4-cylinder 15-hp. Le Roi gasoline motor mounted on the rear of the car. This motor transmits power to the rear saws through a clutch on its own drive shaft and then through a spocket and chain drive to the saw shaft. Power for the operation of the forward saws is provided through a chain drive from the rear saw shaft.

In the actual operation of scoring, the machine is drawn over the track by a heavy duty extra gang motor car at the rate of about two to three miles per hour, while the saws are run at the rate of about 1,000 to 1,200 revolutions per minute. The connection between the motor car and the machine is a pipe draw-bar about 10 ft. long which can be removed when desired.

Setting of the saws for the proper depth of scoring is accomplished by means of four hand-operated female socket wrenches which operate over long threaded bolts extending in each case from the guide boxes up through the floor of the car. One turn of any one of these wrenches raises the saw affected ⅛-in. When the saws have been adjusted for the proper

**The Saws Are Arranged in Pairs**

depth of scoring they are secured in position by locks or set-screws which clamp the shaft boxes within their vertical guides. These locks are operated by hand through rods which extend to the front of the car.

A special arrangement on the machine for raising all of the saws simultaneously, entirely clear of the ties without affecting their adjustment when returned to their lowered positions, consists of a cable, operating over grooved pulleys on the two saw shafts and on two parallel shafts across the top of the car, which is taken in by the operation of a crank connected to the end of one of the parallel shafts. After the saw locks have been released, about 2½ turns of this crank will raise all four saws several inches above the tops of the rails where they are held by a ratchet and pawl. With the saws in this position, the machine can be moved readily over the track in going from one piece of work to another or

when clearing trains. When it is desired to resume work, the saws can be lowered to their former gaged positions by simply releasing the pawl and reversing the crank, after which the locks must be set. This operation of raising the saws or lowering them requires only about a half minute.

The entire force required to accompany the scoring machine in double-track territory consist of a mechanic, who is in charge, and two track laborers; one to operate the motor car, and the other to flag in the direction of traffic. With this force the entire operation of the machine can be carried on smoothly at the rate of about two to three miles per hour. The

**Ties Scored by Machine in Advance of Adzing**

only work necessary in advance of the scoring is to see that sufficient ballast is removed from between the ties near the ends of the tieplates to prevent fouling of the saws while in operation. This work, which under ordinary conditions does not amount to much, is taken care of by the regular section forces.

In spite of this preliminary work, fine grit which may be on top of the ties, and in some instances forced into them, causes severe wear on the saws, which, together with the normal wear in cutting the ties, necessitates the resharpening of the saws after about each mile of scoring. While this is an unfortunate situation, making it necessary to carry a considerable number of saws on hand and causing some delay in the work, it is not a serious drawback to the machine as a complete set of saws can be changed in about 15 minutes and each saw is good for a number of sharpenings. Under the present arrangement, dull saws are sent to the maker, the American Saw Mill Machinery Company, Hackettstown, N. J., for re-sharpening. However, consideration is being given to the possibility of purchasing a sharpening machine and doing this work at the company's own shops or in the field.

That the scoring machine as now designed is a practical unit, incorporating simplicity of design and operation, dependability, and efficiency, has been demonstrated on the Lackawanna during the past summer when nearly 100 miles of track was scored in advance of rail laying. Operating over all classes of ties in this distance,each tie requiring it was scored to the proper depth in four places, accurately gaging the amount of adzing necessary to produce a new uniform base of the proper inclination for the tie plates. Thus, in passing over new ties in which the plates had not embedded themselves, little or no adzing was done, while in passing over old ties where the plates had cut into them, the saws scored to the depth necessary to give a new plate surface in a true plane with the new plate surfaces to be formed on the adjacent ties. As a result of the scoring work, the adzing which followed was done so accurately that all ties gave a solid bearing under the relaid rail without any picking up of low ties or re-surfacing of track.

One of the other important advantages of the machine in this work is that it permits the Lackawanna to use its standard tie plate with a 1 in 40 inclination on curves where the cant is usually made 1 in 20, and through switches where the rails are kept perpendicular, as well as on tangents where the tie plates give directly the inclination desired. This is made possible by the adjustable saws on the machine, which are set for scoring for level adzing on tangents, a 1 in 40 adzing inward on curves which in combination with the 1 in 40 plate gives the desired 1 in 20 cant, and for adzing a 1 in 40 cant outward through switches which offsets the 1 in 40 inward cant of the tie plates.

### Cost of Operation

Of the large mileage of ties scored on the Lackawanna during 1926, possibly the most representative section of the work for which operating and cost data are available, was 27 miles of track scored on the Buffalo division during the summer. Here a force of three men completed the scoring in 18 eight-hour days, changing out 93 saws to be sharpened and clearing for 70 trains.

The division of the entire cost of this work per mile of track scored was as follows:

| | |
|---|---|
| Labor Cost | $ 7.16 |
| Cost of Sharpening Saws | 6.20 |
| Cost of Fuel and Oil | .30 |
| Total | $13.66 |

While this cost is low considering the character of the work accomplished and the direct effect it had on the cost and quality of adzing, it is expected that this amount can be reduced to a still lower figure where traffic interferences are fewer and if it should be decided to sharpen the saws by company forces.

As previously stated, the tie scoring machine described was designed and developed by A. J. Neafie, principal assistant engineer of the Lackawanna, the reconstruction of the machine to its present design having been done at the company's Elmira, N. Y., shops.

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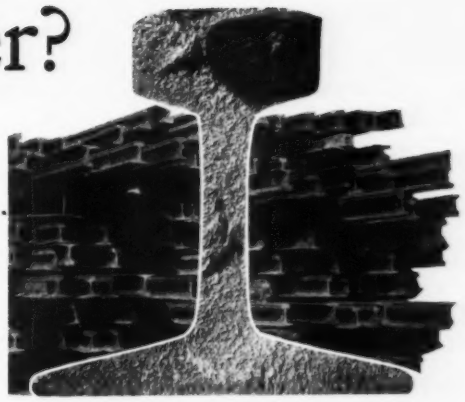
**Chicago & Alton Freight House Which Was Moved 333 Ft. Without Injury**

# What's the Answer?

**What Our Readers Have to Say on Current Questions That Perplex Those Engaged in Maintaining Tracks, Structures and Water Supply Facilities**



**QUESTIONS TO BE ANSWERED IN THE JULY ISSUE**

1. *To what extent should a reserve stock of tools be maintained at each roadmaster's headquarters for emergency use?*
2. *Where clam shell buckets are used for removing cinders from concrete cinder pits what is the best method of protecting the concrete from injury?*
3. *What is the cause of pumping joints and what steps may be taken to prevent them?*
4. *To what extent is it advisable to keep a stock of piling and bridge timbers on each division for emergency use?*
5. *In making a general overhauling of main tracks is it economical to leave ties which will give only one more year of service, or should all ties be removed which will not give a minimum service of two years?*
6. *What is the best method of repairing built up roofing?*
7. *To what extent is it advisable to return a motor car to the same gang after it has been sent to the shops for overhauling or repairs?*
8. *What are the practicable limits to which hot water of different temperatures may be raised in suction lines?*

## Side Load or Center Load Inspection Cars?

*What are the relative merits of side load and center load motor cars for inspection purposes?*

### Prefers the Center Load Car

By J. R. Watt

General Roadmaster, Louisville & Nashville, Louisville, Ky.

I do not favor the use of side load motor cars for such cars must be built so as to lead to the rail. This makes them derail easily and they will sometimes derail with apparently no cause. While such cars can be built with slightly less weight, the weight is not balanced so as to be easily handled. Side load motor cars can be built slightly cheaper than center load cars but the maintenance cost will run higher, especially in wheels. My main objection to the side load motor car is the danger of derailment.

### Each Has Advantages Under Certain Conditions

By Herbert I. Benjamin

Assistant Division Engineer, Southern Pacific, Portland, Ore.

There is considerable difference of opinion as to the advantages and disadvantages of these two types of inspection cars, depending to a large extent on the character of the grades and alinement, and also on the traffic. The center load car may be equipped with a free-running engine, avoiding the neccessity of killing the engine when the car is stopped and also of shoving the car to start the engine. With this type of car there is less danger of derailment due to unbalanced load or to the wheels being out of true, while it usually has greater seating capacity, enabling it to carry more men than the side load car, and there is usually less vibration. On the other hand, the side load car can be removed from the track or turned over more easily than the center load car in cases of emergency, and minor adjustments and repairs may be made more easily by the operator of the car, since the power unit and drive are usually more simple than those of the other type.

The center load car ordinarily will be found preferable on lines with long tangents, low grades and light curvature, while the side load car is advantageous in mountainous territory with heavy grades and sharp curves where the view of the track ahead is often obscured and where the car sometimes must be taken off of the track quickly to avoid collision with trains.

## Pulling Steel Sheet Piles

*What is the best rig for pulling sheet piles?*

### An A-Frame is Best for Long Piles

By F. H. Cramer

Assistant Bridge Engineer, Chicago, Burlington & Quincy, Chicago, Ill.

Where the piles are not over 24 ft. in length it is our practice to pull them with a wrecking derrick when the cofferdam is so located that they can be reached from a track. The nearest available division derrick is used and these range from 60-tons to 150-tons capacity. Where longer piles are to be pulled or where distortion of the cofferdam has warped the piles we use an A-frame built of sound second hand bridge timbers, the legs being either two or three thicknesses of 8-in. by 16-in. timbers and the top of the frame of two thick-

nesses of 12-in. by 14-in. timbers, the whole bolted together securely. The frames are made in heights of from 15 to 25 ft. and wherever possible are set on the inside of the cofferdam. Five-sheave blocks are used, the upper block being hung by looping a heavy cable around the top timbers of the frame.

For fastening to the pile, a heavy bolt is passed through the hole near the top of the pile, the bolt also passing through heavy wooden blocks on each side, which are drawn up snugly to the pile. The pull is made on these blocks, which prevent the bolt from bending. When the piling has been driven into sandy material the use of a water jet will relieve the pressure against the piles and assist materially in pulling them. Much of the trouble in pulling sheeet piles can be avoided by the use of sufficient bracing to prevent distortion of the cofferdam and by keeping the forms from direct contact with the piles.

## Cleaning Ballast

*When cleaning ballast is it necessary to clean the ballast in the cribs between the rails, or is it sufficient merely to clean the ballast on the shoulders to secure proper drainage?*

### The Method Depends Upon the Condition of the Ballast

By J. B. Baker
Chief Engineer Maintenance of Way, Central Region, Pennsylvania, Pittsburgh, Pa.

The manner in which ballast cleaning is done depends largely upon the condition of the subgrade and ballast in the track. In case the ballast in the tie cribs is fouled only by sparks and engine cinders, the cribs can often be cleaned satisfactorily by sweepers or suction cleaners. When the ballast in the cribs requires cleaning on account of clay, fine coal, or similar material it is our practice to throw the ballast from the cribs into the inter-track space where the dirt is removed in the usual manner and the cribs filled either with cleaned ballast from the inter-track space or with new ballast.

### Usually Not Necessary to Clean the Ballast in the Cribs

By J. V. Neubert
Engineer Maintenance of Way, New York Central, New York

As a general proposition, and particularly on two or more adjacent tracks, it is not necessary to clean the ballast between the rails or ties. The method recommended is to clean thoroughly the ballast on the shoulders or between the tracks to a depth of from 6 to 12 in. below the bottom of the ties. The sparks, cinders and other foreign matter, particularly that within the tie section will work towards the ends of the ties, due to the rain and the work done on the track. Hence, if the shoulder or the space between the tracks is kept free from this material, sufficient drainage will be afforded the track structure. There are locations where the drainage conditions become so bad that crib cleaning must be done, and in such cases a better sub-ballast should be provided.

There is much difference of opinion on this question, but I can cite a case where a very bad condition was remedied without cribbing. This was on two adjoining tracks where the ballast became so foul that it prevented proper drainage and as a consequence, became very muddy. The gravel in the area between the tracks was cleaned thoroughly to a point below the ties and within 10 days the track had dried out and could be maintained in good condition. Cribbing is such expensive work that it is advisable to avoid it unless absolutely necessary.

### The Cribs Should Be Cleaned in Coarse Ballast

By J. D. Keiley
Division Engineer, Chesapeake & Ohio, Clifton Forge, Va.

The ballast cleaning operation is dependent upon the kind of ballast used, the standard ballast section, the condition and kind of material in the subgrade and the condition of the ditches. The purpose of all ballast cleaning is to allow the water to drain quickly and readily from the bottom of the ties and away from the track section.

Where broken stone, crushed slag or other material is used for ballast and the voids are sufficient to allow quick drainage, all of the ballast on the shoulder and in the cribs should be cleaned thoroughly. If the shoulder ballast is cleaned and the crib ballast is not cleaned and the voids in the ballast are sufficient, the dirt from the crib ballast will wash down and foul the shoulder ballast. The depth beneath the bottom of the tie to which the shoulder ballast is broken down and cleaned is dependent on the condition of the material under the tie. The depth should vary from two to six inches. Special care should be taken to see that the ballast is cleaned at the shoulder to at least 2 in. beneath the bottom of the tie, especially where the track is dirty, because otherwise there will be a wall around the bottom of the tie which will hold water. The crib ballast should be cleaned to the bottom of the tie, sloping downward and outward to the shoulder, care being taken to see that all foul material is removed from the bottom edge of the tie to insure good drainage.

Where washed gravel ballast is used, better drainage can sometimes be secured by removing a few inches of the ballast from the top of the shoulders and cribs. Washed gravel ballast with small voids will usually retain most of the fouling material in the first few inches which will form a crust or shell.

## Painting by Contract or Company Forces

*What are the relative advantages and disadvantages of painting railroad buildings by contract or by company forces?*

### Improved Devices Make Company Painting Preferable

By I. H. Schram
Engineer Maintenance of Way, Eastern District, Erie, Hornell, N. Y.

The best methods of painting railway buildings as well as other railroad structures are changing at this time, due to the introduction of labor saving machinery. At one time better results were obtained by contracting railroad painting on lines through northern latitudes, rather than doing it with company forces, as it was impracticable to move painting gangs to divisions where the climate was more favorable during the winter. Railroad painting gangs were, therefore, either laid off entirely in the winter time or else reduced to a skeleton organization and employed on inside painting and odd jobs. The result was that much painting was done which was unnecessary during the winter, merely to keep the men employed. A great deal of time was also lost moving them back and forth to get interior painting

work done at many locations. Then when weather conditions became favorable, the gangs were expanded and inexperienced men were employed, who slowed down the entire gang, and produced inferior work. The general result was unsatisfactory and expensive painting. To avoid this we contracted station painting for a number of years, furnishing the paints to insure uniformity and adherence to standards, etc., and employing enough inspectors to make sure that good work was performed. It was generally possible to obtain local contractors who took considerable pride in their work and who did the work for a reasonable price. The present objection to this method is the fact that the local painting contractor generally is not in a position to buy labor-saving equipment and in some places union rules interfere with its use.

Station buildings, shops, roundhouses and freight houses, with their large expanse of wall surface, offer excellent objects for spray painting and we are therefore supplying our carpenter forces with these improved tools with the result that by a small expansion of our force and the employment of only a few skilled painters we are able to reduce our painting costs considerably. While this movement is in its infancy with us, the indications are that a considerable saving will be made and that this system is a proper one for railroads in the northern part of the United States.

### Company Work for All but the Largest Jobs

By G. M. Johnson

Supervisor Bridges and Buildings, Wabash, Montpelier, Ohio

It is hard to interest bidders in the ordinary program for painting railroad buildings, since most of the work is on comparatively small buildings, which involves many shifts in the location of the gangs. When painting is done by contract the railroad company should have an inspector to see that the contract and specifications are observed and on small jobs it is difficult to keep this expense within reasonable bounds. Where contract work is carried on without inspection the commonest faults are the failure to prepare the surfaces properly before they are painted and also the use of poor materials. On company work these can be controlled more easily, due to the desire of the foreman to retain his job by doing good work.

For the larger structures painting by contract is often preferable, since in such cases the relative cost of inspection is not great and the program can be outlined and adhered to.

### Proper Organization Will Make Company Forces Efficient

By J. D. Keiley

Division Engineer, Chesapeake & Ohio, Clifton Forge, Va.

If a contractor can make money painting railway buildings and the railway cannot do the work as efficiently and as cheaply it is an indication of a weak organization on the part of the railroad. There are some exceptions to this, as where the interiors of expensive stations and other buildings require the services of experts or the painting of high steel smoke stacks where a steeple jack can do the work more cheaply. There are many reasons why railroads fail in painting and one of these is because they try to make painters of carpenters. While anyone can paint, it takes an experienced man to do the work properly. The high cost of railroad painting is the result of painting forces being hustled together to paint for a few months of the season and then disband. In cases of this kind the labor turnover is large and usually a poor grade of mechanics is obtained, as short seasonal work of this character will not attract good men.

Painting forces, if properly organized, can take advantage of many kinds of labor-saving devices, especially the paint spray, motor car, knock-down scaffold, etc., and if they are given year-round employment, experienced painters can be retained. A paint force so organized will have a proper assortment of scaffolds, blocks, tackles, etc., and will become proficient in doing work quickly and well.

## Cutting Rails With Hacksaws

*What are the relative merits of hand-operated hacksaws and track chisels for cutting rails?*

### Hacksaws Have Advantages in Some Situations

By E. D. Swift

Engineer Maintenance of Way, Belt Railway of Chicago, Chicago, Ill.

There are many situations where rails may be sawed by hand at less expense than cutting with chisels, provided a good grade of saws is used, and the men are trained to use them properly. In recent years we have almost completely discontinued the use of hacksaws, but I attribute this more to carelessness than to any assurance that the chisel is a more practical tool.

In 1913 we conducted a test for determining which of several makes of saw blades was the best for rail cutting. It was found by this test that two men accustomed to using saws could cut an 80-lb. rail in approximately 30 min. Of course, this is considerably more time than is required with a chisel, but on the other hand it takes more men with the chisel method, and there is the further consideration that a sawed cut is always a good one, which cannot be said for all chisel cuts. This test indicated the desirability of using a fresh saw blade for each cut. The second cut with the same blade require about 20 per cent more time, but a more important feature is the increasing liability of saw breakage, and consequent difficulty encountered by having to make the rest of the cut from a different starting point, as a new saw will not enter the scurf of an old saw.

### The Chisel Is Cheaper and Does As Good Work As the Hacksaw

By J. D. Keiley

Division Engineer, Chesapeake & Ohio, Clifton Forge, Va.

The quality of work done in cutting a rail by the use of a hand hacksaw is good, but in most cases the cost and the length of time it takes to make the cut hardly warrant the expense, since a rail can be cut accurately and successfully by use of track chisels by experienced track men in less time and at a lower cost. In many cases the time element of getting the rail cut and in the track is far more important than the actual cost of the cutting. With the latest improved track chisels many rails can be cut without injury to the cutting edge of the chisel which was not true of the old chisel and this was a great disadvantage and resulted in costly operation.

In cutting a rail with a track chisel, the foreman should mark the length of the rail carefully and accurately and then mark a line with chalk across the base of the rail and up both sides of the web. The line of the chisel cut across the base of the rail and up the web should be continuous and square. The depth of the cut must be uniform for if the depth is not uniform

the rail will not break clean. Under no circumstances should a cut be made across the ball of the rail. In making the chisel cut a sledge hammer should be used so as not to destroy the face of the chisel and as a protection to the man holding the chisel, who should wear goggles. If the rail is cut in the above manner and the foreman supervising the cutting thoroughly understands the process, he will get as accurate a cut for all practical purposes as could be obtained by a hand hacksaw.

## Material for Bridge Ties

*To what extent is a railroad justified in using oak bridge ties instead of yellow pine or Douglas fir?*

### Sound Yellow Pine Bridge Ties Have a Long Service Life

By J. D. KEILEY

Division Engineer, Chesapeake & Ohio, Clifton Forge, Va.

In 1903 and 1904, 5,000 southern pine ties, 85 per cent heart, were installed on a bridge, over which a dense and heavy tonnage was handled. The ties were not tie plated originally. Approximately half the ties were hewed. The track was on a curve and was elevated accordingly. In 1923 the majority of these ties were removed on account of mechanical wear and checking. In all probability the tie life would have been increased materially if the ties had been tie plated when installed.

If 85 per cent heart southern pine can be obtained and the standards of inspection are adhered to thoroughly so as to insure the securing of timber in accordance with the specifications the pine ties should give sufficient service where the useful life of the tie is governed more by the mechanical wear due to tonnage and traffic than by decay.

### Consideration Must Be Given to the Service Required

By P. G. LANG, JR.

Engineer of Bridges, Baltimore & Ohio, Baltimore, Md.

In selecting the kind of timber to be used for bridge ties, consideration should be given to the use to which these ties are put. Bridge ties primarily resist bending stresses, carrying the load from the rail to the supporting bridge structure. There is also the question of the bearing of rails or tie plates on the tie. The bearing of the tie on the supporting bridge structure is not so vital, as usually a larger area is provided than in the case of the rail or tie plates on the tie. Therefore, considering the bending stresses, it would seem that suitable long leaf yellow pine is the most satisfactory timber for such use. Instances are known where long leaf yellow pine bridge ties, untreated, are still in service after 25 years.

White oak is satisfactory in bearing, but seems to have more of a tendency to split under bending stresses than long leaf yellow pine. Douglas fir is a satisfactory timber from the standpoint of bending, but its value in bearing across the grain is not as good as either yellow pine or oak. The growth of the turpentine industry has had some effect on the quality of yellow pine. The resinous content of this wood, where the timber is grown to maturity under natural conditions, perhaps constitutes a natural preservative, whereas the bleeding of trees for other products affects the quality of the timber finally obtained from such trees.

It would seem that the question of whether white oak, yellow pine or Douglas fir timber is to be used for bridge ties depends on the locality where the ties is to be used and the resultant relative costs. Under present conditions, where all timber has greatly increased in price and it has become not only necessary but economical to use treated timber, the differences in the timber actually used tend to disappear. It would seem, at the present time, that white oak and yellow pine ties, when treated, give approximately equal service with Douglas fir running a very close second to these timbers.

## Trouble With Float Valves From Freezing

*What precautions can be taken to prevent float valves from becoming inoperative from freezing?*

### Heating the Water is Effective

By J. R. HICKOX

Hydraulic Engineer, Chicago, Burlington & Quincy, Chicago

On the northwestern parts of our lines where the winters are very severe we avoid the use of float valves as much as possible and use altitude valves instead or automatic control for the pumps. The troubles from ice in a water tank are not confined to the float valve and float, since the formation of heavy ice along the sides of the tank is apt to damage the riser pipes, ladders, etc., in the interior of the tank where it becomes loosened and rises to the surface of the water. For that reason we have installed heaters in our tanks where we have had the most trouble with ice, warming the water sufficiently to prevent freezing. We have had the best results by the use of a 10 hp. boiler, arranged so as to deliver the heated water to the bottom of the tank and to draw the return water from the top of the tank, thus affording circulation.

We find that the heating of the water is particularly advantageous at treating plants since the water responds better to the treatment if it is raised several degrees above the freezing point and at some stations we have put in the heating boiler as a part of the regular installation. We tried placing stoves in the frost proofing under the tank in a few instances but have not continued the practice since it required a great deal of coal and attention and the results were not always satisfactory otherwise.

In places where we use altitude valves or automatic control of the pumps actuated by a reduction of the pressure, and where it is essential that the water level in the tank be kept as nearly uniform as possible we have tapped the pressure line into the supply pipe to the water cranes. This insures that the pump will be started as soon as the crane valve is opened and affords a more positive and quickly responsive control than where the altitude valve is tapped into the tank.

### Provide a Circulation of Water Through the Body of the Float Valve

By A. I. GAUTHIER

Supervisor Bridges and Buildings, Boston & Maine, Concord, N. H.

We prevent float valves from freezing by tapping the body of the float valve just back of the valve seat and installing ¼-in pipe, an elbow and a ¼-in. valve. In periods of cold weather the ¼-in. valve is opened sufficiently to cause a circulation of the water in the supply pipe and the body of the valve back of the valve seat, thereby keeping the float valve from freezing. In order that the circulation caused by the flow of water may be effective, the body of the float valve should be tapped as

near the valve seat as practicable, and the float should be arranged to shut off the flow of water through the supply pipe when the water in the tank reaches a point about 12 in. below the overflow pipe to prevent wastage of water due to the steady flow through the ¼-in. pipe.

## Should Monuments Be Set to Show the Superelevation?

*Is it worth while to place monuments on the shoulder of the roadbed to show the beginning and end of curves and spirals, and to mark thereon the superelevation to be used?*

### The Benefits Gained Do Not Offset the Disadvantages

By A. F. Blaess

Chief Engineer, Illinois Central, Chicago

Monuments of this kind are helpful to the trackman, but the cost of installation and maintenance is considerable; they also cause considerable interference with the operation of spreaders and power mowing machines. For these reasons, I do not believe that the benefits to be derived are sufficient to offset the cost and other objectionable features. Permanent monuments marking the beginning and end of curves and spirals should be placed in the center of the track and the foreman can obtain from the supervisor the proper elevation to be used for each curve.

### Markers for Curves Are Worth While

By W. C. Vandiver

Supervisor, Louisville & Nashville, La Grange, Ky.

It is worth while to mark the beginning and end of all curves with stakes or posts with the degree of curve and the amount of superelevation marked thereon. These posts should be made of concrete, 4-in. by 4-in. square and 3 ft. 6 in. long, placed far enough from the track so that they will not interfere with trainmen while getting on or off cars.

With these markers the foreman knows the proper amount of superelevation to provide and there is no chance for confusion. They are also of value to temporary foremen who may be called on to relieve the regular foreman, especially when the relief foreman is not familiar with the section.

### Markers Should Show Degree of Curve But Not Super-elevation

By H. L. Bell

Division Engineer, Southern Pacific Lines, Houston, Texas

Where track is to be maintained in good condition monuments or markers should be placed to show the beginning and end of curves and spirals. Special instructions to the foremen are necessary in order for them properly to maintain good riding track on curves and it is important that the locations to which these instructions are to apply be properly indicated. Concrete or timber stakes 4-in. by 4-in. by 30-in. long, placed in the shoulder of the roadbed, make good markers. For the benefit of the engineering department the curve number, degree of the curve and engineer's station should be shown on the monument but it is not always desirable to show on the monument the amount of superelevation to be maintained, since changing operating conditions often make it necessary to increase or reduce the superelevation.

A table should be prepared for the curves on each section and copies furnished to each section foreman indicating: (1) the mile post location of the curve; (2) the number of the curve; (3) the degree of the curve; (4) the length of spirals; (5) the elevation to be maintained in the curve; (6) instructions relative to the maintenance of special conditions. Copies of the table should be furnished to the roadmasters and supervisors and each foreman should be required to keep one of his copies on the bulletin board in his tool house and one pasted in his book of rules so that information will be available at any time it is needed. It is desirable to further aid the foreman by painting on the rail the amount of superelevation to be maintained at the points of beginning and of full elevation of the curve and at each ½-in. change in superelevation between these points. These figures may be repainted easily in case it is desired to change the superelevation of the curve.

### Curve Monuments Are Useful for Many Purposes

By First Assistant Engineer

The placing of monuments on the shoulders of the roadbed to indicate the ends of curves and spirals and to mark thereon the superelevation to be used on the main curve is more than worth while.

The superelevation for a curve should be worked out on the ground by the roadmaster or division engineer, or both, thereby precluding the possibility of the section foreman going wrong in giving the curve its proper superelevation. After the superelevation has been determined and marked on the monuments it is always used and the section foreman does not have to rely on his memory as to what elevation he used the last time he surfaced the curve. The monuments also prevent the section foreman from carrying the run-off onto tangent track as is often the case and which often causes a bad riding curve. This condition is sometimes difficult to determine and usually necessitates an engineer going into the field to set center stakes for lining the curve and grade stakes for giving the proper super-elevation.

These monuments are a great aid to the engineer in re-staking the curve where this work has to be done for rail laying and ballasting. The section foreman can use them for checking the alinement of curves as they are always placed at a uniform distance from the gage side of the rail.

The elevation and the degree of the curve shown on the monuments are a guide to the locomotive engineer who likes to know the degree of the curve in order to control the speed of his train. This speed control helps the maintenance of the curve as a restriction of speed on a sharp curve tends to keep the curve from being thrown out of line and consequently out of surface. Monuments on a curve are a guide to every one who has anything to do with the curve in that they give complete information regarding a particular curve, both as to maintenance and operation.

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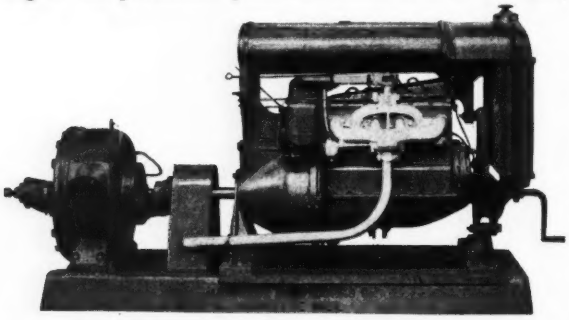
An Accommodating Railroad.—Among the unusual railroads of the country is the Galesburg & Great Eastern, which is ten miles long and is owned by farmers and business men of Victoria, Ill. The method of hailing trains on this railroad is very simple. The prospective passenger merely walks out on the right of way and holds up his hand. Similarly, when a passenger wishes to get off, the train will be stopped for him in the exact spot he selects. Instead of having to walk or drive home from the station, he can have the train stopped behind his barn and walk right in on the folks with no loss of time.

## A Direct-Connected Centrifugal Pump Driven by a Fordson Tractor Motor

THE Detroit, Toledo & Ironton has developed an interesting type of direct-connected centrifugal pumping unit for water service, which combines compactness, simplicity and ease of repairs and maintenance. Six pumps of this type have been installed on that road where they are said to have given service satisfactory in every respect.

The unit is composed of a centrifugal pump of the type and capacity adapted to the conditions prevailing at the particular point at which it is to be used,



**A Detroit, Toledo & Ironton Direct Connected Pumping Unit**

driven by a Fordson tractor motor, the whole assembled on one bed plate. The pumps are manufactured by the Manistee Pump Company, Manistee, Mich., and are shipped on bed plates so designed as to receive the tractor motor and to permit its being attached to the pump by a direct flanged coupling.

The standard Fordson tractor motor which comprises the power plant is complete with spark plugs, magneto, gas tank, radiator and one bearing 4.726 in. in diameter, together with special parts consisting of two cast iron supports for the motor, a cast iron clutch housing, a special machined cast iron dash to support the gas tank and control, and a drive shaft with a collar.

In selecting a pump for a given water station it is necessary to know the head against which the water must be delivered, as well as the suction lift. Of the installations on the D. T. & I., four are two-stage pumps rated at 400 gal. per min., at 1,230 r.p.m. against a 70-ft head; one is a four-stage pump rated at 400 gal. per min. at 1,150 r.p.m. against a 145-ft. head and one is a four-stage pump rated at 220 gal. per min. at 1,430 r.p.m. against a 227-ft. head. Some of these pumps have been in operation over three years and the only maintenance they have required has been the re-packing of the stuffing boxes.

These pumping units on the D. T. & I., are used from three to four hours a day, depending on conditions, and it is said that the oil consumption has been about one quart daily, with a consumption of one gallon of kerosene to each 24,000 gal. of water pumped. Cost figures kept at each of the pumping stations where these units are installed show that costs as low as 5.76 cents per thousand gallons have been attained.

## New Air-Driven Portable Hand-Saw

THE Ingersoll-Rand Co., New York, has recently devised and put on the market an automatic portable hand-saw operated by compressed air which adds another important labor-saving unit to its extensive line of air-operated tools adaptable to railroad work. This saw, which consists essentially of an Ingersoll-Rand three-cylinder type air motor, a circular saw blade and a Crowe safety saw guard, together with suitable hand grips for ease of operation, is designed for a wide range of work. By merely removing a single nut and changing blades, the saw may be used for cutting any kind of wood and also for sawing such materials as soapstone, bakelite, wall-board, cable and copper. For all of these classes of cutting, both cross-cut and rip saw blades are available. When actually cutting, the saw can be held in any position with little fatigue to the operator and can be operated at a speed about 20 times as fast as a workman can ply the ordinary hand-saw.

This new saw, which can be carried about easily, is manufactured in three sizes, the B6 which takes a 6-in. blade, the B8 which takes an 8-in. blade, and the B12 which accommodates a 12-in. blade. In all of these sizes the machine is compact in form and the weight has been kept to a minimum, the 8-in. size weighing only 23 lb.

One of the special features of the new air-driven saw is the Crowe safety saw guard with which it is equipped. This guard, which affords complete protection to the operator and to the blade under all conditions, consists of two telescoping parts. The main part of the guard, which extends over the top of the blade, forms a rigid part of the saw frame and affords a

place for the forward hand grip, while the lower half of the guard is pivoted at its inner end to the frame and raises or lowers automatically as the saw cuts into the wood or is withdrawn, the outer end of this part of the guard telescoping into the upper half of the guard. When a cut is completed, the lower guard drops automatically to its lowest position and locks, thereby affording complete protection to the blade when not in use. Another special feature of this guard is the adjustable stop provided on the upper half, which limits the travel of the lower half of the guard and

**Ripping Four-Inch Planking With the Air-Driven Hand-Saw**

thereby makes it possible to set the saw for any required depth of cut. This guard has been approved by the Ohio Industrial Commission, the Pennsylvania and New Jersey departments of labor and the Underwriters' Laboratories.

Owing to the safety features of the saw and the fact that all of its parts are renewable, including the wearing parts of the motor, it is claimed that the upkeep cost of the saw is practicably negligible, and it is further claimed that this saw is capable of reducing sawing costs from 50 to 75 per cent below the cost of sawing with the common hand-saw.

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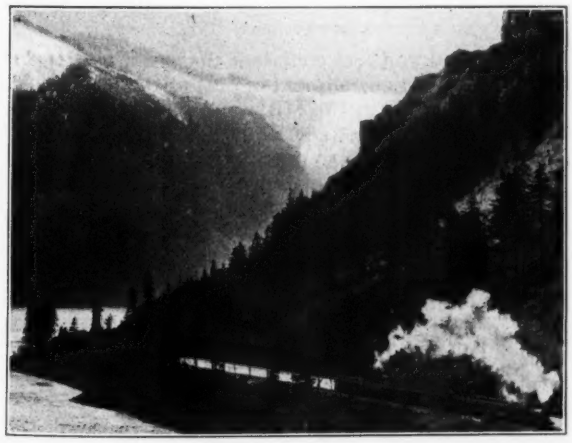


**On the Spokane, Portland & Seattle in the Gorge of the Columbia River Through the Cascade Mountains**

# With the Associations

### The Tie Producers Association

The Arlington Hotel has been selected as headquarters for the next annual convention which will be held at Hot Springs, Ark., on April 24-26, 1928.

### The Bridge and Building Association

A meeting of the Executive Committee was held at the Engineers' Club, Chicago, on Wednesday evening, April 20, at which the work of the association was reviewed. Progress reports were presented from the eight standing committees, indicating that the reports are well in hand and some of them approaching completion. Fifteen applications for membership have been received since the conclusion of the last convention and a number of others were reported in the process of preparation in the campaign for 100 new members this year.

The proceedings of the thirty-sixth annual convention are now being distributed to the members.

### The Engineering Association

Although only six weeks have elapsed since the adjournment of the annual convention, seven of the standing committees of the A. R. E. A. have held meetings and two more have called meetings late this month. The Committee on Rail met in New York on April 15 with 18 members present; the Committee on Economics of Railway Operation at Chicago on the same date with 12 present; the Committee on Water Service at Chicago on April 19 with 18 present; the Committee on Ballast at Chicago on April 20 with eight present, the Committee on Roadway at the same place on the following day with 10 present, the Committee on Ties at Cincinnati, Ohio, on April 21 with 12 present; and the Committee on Yards and Terminals at Chicago on October 25, with 23 present; while the committee on Rules and Organization and on Wooden Bridges and Trestles have called meetings in Chicago on April 29.

The Board of Direction of the A. R. E. A., and the General Committee of the Engineering division of the A. R. A. will meet in New York on May 11.

The association has elected its first woman to membership, the applicant being Miss Olive Wetzel Dennis, engineer of service on the staff of President Willard of the Baltimore & Ohio. Miss Wetzel is a civil engineering graduate of Cornell University.

Experiments inaugurated in February with the Sperry rail flaw detector under the direction of the Rail committee are being continued in the laboratory of the Sperry Gyroscope Company in Brooklyn, New York, with encouraging results to date. An additional appropriation has been requested from the A. R. A. to enable the experiments to be continued in the field.

# The Material Market

IT IS CLEAR that the advent of the coal strike has had no immediate effect on the nation's business other than to bring about a reduction in the weekly production of coal from about 13,000,000 tons to about 8,000,000 tons and a corresponding reduction in the weekly loading of coal from 213,442 cars during the week ending on March 19 to 152,876 cars for the week of April 9. That it will not curtail manufacturing operations for several months to come is apparently the prevailing thought of buyers for there has been no evidence of any tendency to increase purchases for the purpose of developing greater reserve stocks. The manufacturers of the steel industry, however, seem to have the future more definitely in mind and are continuing production at a greater rate than is predicated by the volume of immediate sales, which are now experiencing a seasonal decline.

**Iron and Steel Prices Per 100 Lbs.**

| | March | | April | |
|---|---|---|---|---|
| | Pittsburgh | Chicago | Pittsburgh | Chicago |
| Track spikes | $2.80 to $3.00 | $2.90 | $2.80 to $3.00 | $2.90 |
| Track bolts, ⅞ in. and over | 3.90 to 4.25 | 3.90 | 3.90 to 4.00 | 3.90 |
| Track bolts, ¾ in. and under | | | 70% off list | 70% off list |
| Angle bars | | 2.75 | 2.75 | 2.75 |
| Tie plates, steel | 2.35 | 2.35 | 2.35 | 2.35 |
| Boat spikes | 3.25 | 3.25 | 3.25 | 3.25 |
| Plain wire | 2.40 | 2.45 | 2.40 | 2.45 |
| Wire nails, keg | 2.55 | 2.60 | 2.55 | 2.60 |
| Barb wire, galv | 3.25 | 3.30 | 3.25 | 3.40 |
| C. I. pipe, 6 in. to 12 in., ton | | $42.20 to 45.20 | | $44.20 to 45.20 |
| Plates | 1.80 to 1.90 | 2.00 to 2.10 | 1.80 to 1.90 | 2.00 to 2.10 |
| Shapes | 1.90 | 2.00 to 2.10 | 1.90 | 2.00 to 2.10 |
| Bars, soft steel | 1.90 | 2.00 to 2.10 | 1.90 | 2.00 to 2.10 |
| Rivets, struc. | 2.30 to 2.40 | 2.60 | 2.75 | 2.85 |
| Conc. bars, bil't. | 1.90 | | 1.90 | |
| Conc. bars, rail | 1.70 to 1.80 | 1.90 to 2.00 | 1.75 to 1.80 | 1.90 to 2.00 |
| Rails, per gross ton f.o.b. mills | | 43.00 | | 43.00 |

That there is such a decline is definitely recognized. It also follows that production will fall off. But these tendencies must be considered in the light of the fact that steel production for the first quarter of 1927 was within 2 per cent of the record production for the first quarter of 1926.

### Interim in Rail Purchases

In the case of track materials, the month of April comprises the interim between the closing of business for the major demand for rails and fastenings and the advent of the secondary season of rail buying. In the meantime, however, purchases have not entirely discontinued, as small orders aggregating several thousand tons are being placed from week to week. Demands for fastenings also continued active as there has been some quickening in the shipping orders against contracts previously placed. The largest new business in this field is that placed by the Pennsylvania for 7,000 kegs of spikes, 1,000 tons of tie plates, 1,600 kegs of bolts, and 610 tons of angle bars. The Chesapeake & Ohio has also made a supplementary purchase of 2,000 kegs of spikes. Public authorities in Los Angeles, Cal., have recently ordered 90,000 tie plates and the Alaska Railway is calling for bids for 1,000 tons of rails.

Structural steel awards have continued in considerable volume as has the demand for reinforcing bars, although the latter has been more spotty. Prices on iron and steel items used for roadway and track are steady and no noteworthy changes have taken place. Effective April 1, prices for track bolts ¾ in. in diameter and less have been quoted by discounts from a fixed list under which the prices are given per 100 pieces for each diameter and length, those for ¾-in. bolts being $12.05 for 3 in., $12.70 for 3½-in., $13.35 for 4-in. and $14.00 for 4½-in. The current discount from this list is 70 per cent but premiums are charged for certain specifications as to threads, shape of necks, nuts, etc.

### Railroads Offer Large Tonnages of Scrap

Current quotations on track scrap are the same or higher than those recorded a month ago, although the general tendency of the market is downward. The item of chief interest in this field is the offering of an unusually large amount of materials by the railways, a recent check showing that 17 railroads had 66,000 tons of scrap to dispose of. Chief among these are the Louisville & Nashville, 10,000 tons; the Chesapeake & Ohio, 9,400 tons; the Illinois Central, 9,000 tons; and the Southern, 8,500 tons.

**Scrap Prices Per Gross Ton at Chicago**

| | March | April |
|---|---|---|
| Relaying rails (including angle bars) | $26.00 to $31.00 | $26.00 to $31.00 |
| Rails for rerolling | 15.50 to 16.00 | 16.00 to 16.50 |
| Rails less than 3 ft. long | 16.50 to 17.00 | 16.50 to 17.00 |
| Frogs and switches cut apart | 14.50 to 15.00 | 14.50 to 15.00 |
| Steel angle bars | 14.75 to 15.25 | 14.50 to 15.00 |

### Lumber Sales Show Decrease

Total sales of soft woods reported by the lumber associations for the first 12 weeks of 1927 as compared with the corresponding period in 1926 were 12 per cent less, shipments were 16 per cent less and production was 14 per cent less. Furthermore, current reports indicate no appreciable departure from this relationship during recent weeks. West coast mills are again endeavoring to bring about an agreement that will limit production to a more favorable ratio with demand and feel confident that an arrangement for a 20 per cent curtailment of output can be effected. Disastrous floods in the Mississippi valley have been an agency for the complete suspension of operations by some of the southern pine mills, while a protracted period of rainfall has curtailed output generally but in spite of these influences the average production per mill remains slightly above the average volume of sales. Prices on representative items differ but little from those quoted in last month's issue.

**Southern Pine Mill Prices**

| | March | April |
|---|---|---|
| Flooring, 1x4, B and B, flat | $44.70 | $41.75 |
| Boards, 1x8, No. 1 | 35.60 | 37.09 |
| Dimension, 2x4, 16, No. 1, common | 26.57 | 26.67 |
| Dimension, 2x10, No. 1, common | 28.04 | 29.42 |
| Dimension, 2x4, 16, No. 2, common | 22.63 | 23.81 |
| Dimension, 2x10, No. 2, common | 23.57 | 21.75 |

**Douglas Fir Mill Prices**

| | March | April |
|---|---|---|
| Flooring, 1x4, No. 2 clear, flat | $26.00 | $26.00 |
| Boards, 1x8, 6 to 20, No. 1, common | 16.00 | 16.00 |
| Dimension, 2x4, No. 1, common | 17.00 | 17.00 |
| Dimension, 2x10, 16, No. 1, common | 17.00 | 17.00 |
| Timbers, 6x6 to 8x8, No. 1 | 20.00 | 20.00 |
| Timbers, 3x12 to 12x12, rough | 18.00 | 18.00 |

Except for an advance from $2.31 to $2.51 in the price of Portland cement at San Francisco, the prices quoted below per barrel in carload lots, not including package, are the same as those given in last month's issue.

| | | | |
|---|---|---|---|
| New York | $2.03 | Minneapolis | $2.22 |
| Pittsburgh | 2.04 | Denver | 2.85 |
| New Orleans | 2.40 | Dallas | 2.05 |
| Chicago | 2.05 | San Francisco | 2.51 |
| Cincinnati | 2.32 | Montreal | 1.15 |

# Railway News

# Briefly Told

**Articles of incorporation** of the Chicago, Milwaukee, St. Paul & Pacific, which is the name of the reorganized Chicago, Milwaukee & St. Paul, were filed at Madison, Wis., on March 31.

**Stockholders** of the Chesapeake & Ohio have ratified the merger plans which contemplate the purchase of the Erie and the Pere Marquette, although a minority group of the secuity holders opposed the move.

**Three steel** bridge spans with concrete decks, with a total weight of 800 tons, were moved a distance of 22 ft. in 2 min. 30 sec. to replace old spans over the Sandusky river on the Pennsylvania at Tiffin, Ohio, on April 8.

**The Public Service Commission** of the state of New York issued orders during 1926 for the elimination of 123 highway crossings at grade, at an estimated cost of $9,101,450. In 85 other projects, involving 104 eliminations, the commission was unable to proceed because of the statutory debt limitation or other objections by the interested parties.

**Efforts are being** made in northwestern Canada to induce the Canadian government to build a railway through the Peace River country to serve as an outlet for agricultural products. An amendment to a bill in the Canadian parliament which would have insured an early start on the project was defeated recently. It is said that the cost of the line as proposed would amount to approximately $85,000,000.

**The Central Indiana** has been authorized by the Interstate Commerce Commission to abandon its entire line extending from Muncie, Ind. to Brazil, a distance of 127 miles. The company is owned jointly by the Pennsylvania and the Cleveland, Cincinnati, Chicago & St. Louis. Earnings have not been sufficient to pay operating expenses and taxes and its territory is served by several other carriers.

**In 1926,** for the first time in five years, the amount of dividends paid by the railroads exceeded the amount paid in taxes, although the difference was only one per cent. In 1916, the railroads taxes amounted to slightly more than half the amount paid in dividends. In the following years taxes increased markedly, while the amount paid in dividends declined, taxes in 1923 amounting to 112 per cent of the dividends paid. The total taxes paid by the railroads in 1926 was $388,682,377, while dividends totaled $392,791,959.

**The Interstate Commerce Commission,** in announcing its decision in the case of the St. Louis & O'Fallon, involving the recapture of so-called "excess earnings," held that the value of the property should be based on the cost of reproduction on the date of valuation, computed at the 1914 level of prices, plus the fair value of the land as of the date of valuation, and brought down to date by adding the actual cost of subsequent net additions. The amount of excess earnings claimed by the government is $226,880, which the commission found to be due from the railroad's earnings for the period from March 1, 1920, to December 31, 1923. An order from the commission directing the payment of this sum will open the way to an appeal to the courts, in line with the ruling of the Supreme Court of the United States in its recent decision in the Los Angeles & Salt Lake case.

**Revenue car** loadings for the week ending April 16 totaled 956,875, a decrease of 8,060 as compared with the corresponding week in 1926, but an increase of 33,031 over the loadings for the same week in 1925. Coal loadings for the week were 152,778, showing a decline from weekly loadings of over 200,000 cars previous to the beginning of the miners' strike in the union bituminous coal fields. The cumulative total for the first 16 weeks of the current year is 15,274,169 as compared with 14,808,131 and 14,548,053 for the corresponding periods in 1926 and 1925, respectively.

**The Great Northern** has filed a request with the Interstate Commerce Commission for a decision as to whether the proposed construction and operation of a relocation of its line between Peshastin, Wash., and Winston, 16 miles, and between Berne, Wash., and Scenic, 10.29 miles, and the abandonment of the present line between the points named are such as to require it to first obtain a certificate from the commission. The proposed line between Berne and Scenic will utilize the new tunnel, 7.79 miles long, through the Cascade mountains and will replace 17.94 miles of the present line, lower the summit elevation 502 ft., reduce the major position of a 2.2 per cent grade to 1:57 per cent and eliminate about 6 miles of snow sheds. The line between Peshastin and Winston will shorten the distance approximately one mile and will eliminate trouble from snow slides.

**The Northern Pacific** and the Montana Eastern, the latter a subsidiary of the Great Northern, have filed briefs with the Interstate Commerce Commission on the application of the Northern Pacific for authority to build a branch line from Glendive, Mont., to Circle and Brockway, 64 miles, and the application of the Montana Eastern to build a branch from Richey, Mont., to Circle and Brockway, 53 miles. The two lines would parallel each other between the last named points and each company opposes the granting of the others application. The receivers of the Chicago, Milwaukee & St. Paul, who opposed both applications have withdrawn their opposition but requested the commission to attach conditions to any order authorizing construction of either line that will permit the C. M. & St. P. to connect any line it may build from a point on its line between Terry and Miles City and to operate over the authorized line from Circle to Brockway. The Montana Commission which conducted a hearing for the federal commission recommended granting the application of the Northern Pacific and denying that of the Montana Eastern.

**The Pennsylvania,** largely through efficient fire prevention methods and the promptness of its employees in extinguishing fires on the railroad property before the arrival of the municipal fire departments, suffered a fire loss of only 1/25 of 1 per cent to its property during the year 1926, according to a report compiled by the insurance department of that road. Employees put out 235 fires during the year, the losses in which amounted to only $14,000, while their efforts protected property worth $38,000,000. Out of these 235 fires, organized employee fire brigades extinguished 68 with a loss of only $3,900 in properties insured for nearly $21,000,000; chemical extinguishers, water casks and fire pails were used in putting out 84 fires in which the loss was $3,600 on buildings and equipment valued at $15,590,000, and locomotives equipped with fire fighting apparatus put out 10 fires with a loss of only $372, in property worth $447,000. The company's independent high pressure fire lines were used to extinguish five fires which caused a loss of $1,270 in property worth $818,000.

# Personal Mention

## General

**H. C. Murphy,** engineer maintenance of way of the Chicago Burlington & Quincy, Lines West, with headquarters at Lincoln, Neb., has been appointed transportation assistant on the staff of the general manager of the Lines West of the Missouri river with headquarters at Omaha, Neb.

**R. R. Bragg,** division engineer of the El Paso-Amarillo division of the Chicago, Rock Island & Pacific, with headquarters at Dalhart, Tex., has been promoted to trainmaster on the same division. His headquarters will remain at the same place.

**S. H. Pulliam,** division engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has been promoted to trainmaster, with jurisdiction over Strathmore Yard, and the Virginia Air Line and Buckingham subdivisions, with headquarters at Strathmore, Va. Mr. Pulliam was born on November 20, 1894, at Richmond, Va., and entered railway service as an axeman on the Baltimore & Ohio in January, 1912, subsequently serving as a rodman and inspector until July, 1916, when he was promoted to assistant supervisor of track. He was promoted to assistant division engineer in March, 1918, and in March, 1920, entered the employ of the Van Blarcom Company at Cleveland, Ohio, later entering the real estate business in that city. He returned to railway service in January, 1922, as a supervisor on the Baltimore & Ohio, resigning in 1924 to become division engineer on the Chesapeake & Ohio with headquarters at Richmond, Va., which position he was holding at the time of his recent promotion to trainmaster, with headquarters at Strathmore, Va.

**A. T. Mercier,** general manager of the San Diego & Arizona, with headquarters at San Diego, Cal., whose railway training was largely in the engineering and maintenance of way departments, has been elected president and general manager with headquarters at the same place. Mr. Mercier was born on December 11, 1881, at New Orleans, La., and after the completion of his college course at Tulane University in 1903 entered railroad service as a transitman and roadmaster's clerk on the Southern Pacific at Los Angeles, Cal., afterwards becoming an assistant gang foreman at the same place. In February, 1906, he was promoted to assistant engineer in charge of reconstruction work in the Colorado river territory, with headquarters at Los Angeles, and in March, 1927, he was further promoted to general foreman and engineer of bridges and buildings in charge of steel bridge construction, with the same headquarters. In June of the same year he was appointed engineer and general foreman in charge of terminal construction with headquarters at San Pedro, Cal., and later at Los Angeles. In November, 1908, he was promoted to assistant division engineer of the Los Angeles division, with headquarters at Los Angeles, and in November, 1911, he was made assistant district engineer of the Southern district, with headquarters at the same place, remaining in that position until November, 1912, when he was promoted to division engineer of the San Joaquin division, with headquarters at Bakersfield, Cal. He was transferred to Los Angeles in August, 1913, and in February, 1917, entered the operating department as assistant superintendent of the Shasta division, with headquarters at Dunsmuir, Cal., being promoted to superintendent of the Portland division with headquarters at Portland, Ore., in September, 1918. In 1921, he was appointed general manager of the San Diego & Arizona, with headquarters at San Diego, Cal., which position he still holds in addition to his new duties as president.

A. T. Mercier

**Ralph F. Ray,** general supervisor of wages and working agreements on the Denver & Rio Grande Western, with headquarters at Denver, Colo., and an engineer by training and experience, has been promoted to assistant general manager, with headquarters at Denver. Mr. Ray was born on August 22, 1883, at Wellsville, Ohio, and was educated at the Western University of Pennsylvania, where he graduated in 1903. During his summer vacations from 1899 to 1902, he served in engineering corps on the Pennsylvania and after the completion of his college course he was employed in various capacities in the maintenance and construction departments of that road until 1909, when he became an assistant engineer on construction on the Missouri Pacific, where he also served as designing engineer. From 1915 to 1917 he was engaged on special work for the vice-president of operation, and also, on a leave of absence, as an engineering assistant in the compilation of financial and operating reports on various western railways. In 1917, Mr. Ray was appointed assistant to the president and receiver of the Denver & Rio Grande Western, and was assistant to the federal general manager under the United States Railroad Administration in 1918. He was appointed assistant to the general manager and chief operating officer in 1920, and in 1923 became general supervisor of wages and working agreements, which position he was holding at the time of his recent promotion to assistant general manager.

## Engineering

**H. H. Main** has been appointed assistant engineer maintenance of way of the Toledo, Peoria & Western, with headquarters at Peoria, Ill.

**J. W. Young,** assistant engineer for the Richmond Construction Company, Galveston, Texas, has been appointed assistant engineer on the Ft. Worth & Denver City, with headquarters at Ft. Worth, Texas.

**J. A. Gude,** roadmaster on the Dallas division of the Houston & Texas Central line of the Southern Pacific, with headquarters at Ennis, Tex., has been transferred to the chief engineer's office at Houston, where he will serve as an assistant engineer.

**Joshua D'Esposito,** who has been chief engineer and general manager of the Chicago Union Station, has been appointed consulting engineer and the offices of chief engineer and general manager have been abolished.

**E. E. McLellan,** engineer maintenance of way of the Maryland & Pennsylvania, with headquarters at Baltimore, Md., has been promoted to chief engineer, a newly created position, with the same headquarters, and the position of engineer maintenance of way has been abolished.

**R. E. Cahill,** who has been acting superintendent of the Northern Kansas division of the Missouri Pacific, with headquarters at Atchison, Kan., has resumed his former duties as division engineer at that place, **R. H. Dwyer,** superintendent, who has been on leave of absence, having returned to service.

**H. M. Long,** instrumentman on the St. Louis-Kansas City division of the Chicago, Rock Island & Pacific, at Kansas City, Mo., has been promoted to division engineer of the same division, with headquarters at the same place, to succeed **G. A. Carroll,** who has been transferred to Dalhart, Tex., to replace **R. R. Bragg,** whose promotion to trainmaster is noted elsewhere in this issue.

**W. O. Frame,** roadmaster on the Chicago, Burlington & Quincy, with headquarters at Herrin, Ill., has been promoted to district engineer maintenance of way on the Illinois district, with headquarters at Galesburg, Ill., a newly-created position, the district having been divided in-

sofar as maintenance matters are concerned. Following the promotion of **H. C. Murphy,** engineer maintenance of way of Lines West, as noted elsewhere in this issue, two district engineers maintenance of way have been appointed. **R. L. Sims,** roadmaster on the Hannibal division, Lines East, with headquarters at Cameron, Mo., has been promoted to district engineer of the Nebraska district, with headquarters at Lincoln, Neb., and **A. Chinn,** assistant engineer maintenance of way, with headquarters at Alliance, Neb., has been promoted to district engineer maintenance of way of the Wyoming district with the same headquarters.

**J. D. Keiley,** supervisor on the Chesapeake & Ohio, with headquarters at Russell, Ky., has been promoted to division engineer with headquarters at Clifton Forge, Va., succeeding **T. H. Greene,** who has been transferred to Richmond, Va., to replace **S. H. Pulliam,** whose promotion to trainmaster is noted elsewhere in this issue. **J. W. Knapp, Jr.,** assistant cost engineer, with headquarters at Richmond, has been appointed assistant division engineer with headquarters at the same place, to replace **L. J. Drumeller,** who has been transferred to Russell, Ky., in the same capacity, to succeed Mr. Keiley.

Mr. Keiley was born on April 19, 1889, at Asheville, N. C., and was educated at Brooklyn Polytechnical Institute, following which he was with the Guaranty Trust Company, New York for one year, and then entered railway service in the statistical department of the New York Central. He was later employed in the maintenance of way department until April, 1922, when he became an assistant engineer on the Chesapeake & Ohio at Richmond, Va. In 1924, he was promoted to supervisor with headquarters at Russell, Ky., which position he was holding at the time of his recent promotion to division engineer. Mr. Keiley is chairman of the Committee on the Collection of Cost Data of the Roadmasters' and Maintenance of Way Association of America.

J. D. Keiley

Mr. Knapp was born on April 4, 1900, at Griffin, Ga., and was educated at the Virginia Military Institute, where he graduated in 1921, following which he became assistant professor of military science and tactics at that school and also commandant at the John Marshall High School at Richmond, Va. He entered railway service on October 20, 1923, as a rodman on the Chesapeake & Ohio and on November 26 of the same year was advanced to instrumentman. He was promoted to assistant cost engineer with headquarters at Richmond on June 10, 1925, which position he was holding at the time of his recent promotion to assistant division engineer.

**Harold Rindal,** whose appointment as chief engineer of the Pacific Great Eastern, with headquarters at Vancouver, B. C., was noted in the April issue, was born in Norway on November 1, 1879, and was educated at the Technical College at Trondhjem, Norway. Mr. Rindal entered railway service as a rodman on the Norwegian Government Railway in 1900 and immediately after coming to the United States he became a rodman on the Pennsylvania at Pittsburgh, Pa. In June, 1903, he entered the service of the Canadian Pacific as a transitman at Winnipeg, Man., and in September of the same year was promoted to resident engineer on the Central division at Ft. William, Ont., being further promoted in 1905 to assistant division engineer on the same division, with headquarters at Winnipeg. From April, 1907, to June, 1910, he was assistant engineer in the office of the assistant chief engineer of the Western lines and was then promoted to district engineer of the British Columbia district, with headquarters at Vancouver. He was transferred in 1922 to the Alberta district, with headquarters at Calgary, Alta., and early in the following year resigned to become connected with the North Western Dredging Company at Vancouver. While with this company Mr. Rindal participated in the placing of the gravel fill for the new Canadian Pacific pier at Vancouver and other extensive work in Vancouver harbor, resigning this position at the time of his recent appointment as chief engineer of the Pacific Great Eastern, with headquarters at Vancouver.

**C. F. Allen,** roadmaster on the C. and M. division of the Chicago, Milwaukee & St. Paul, with headquarters at Milwaukee, Wis., has been promoted to division engineer ,with headquarters at the same place, and **R. G. Heck,** assistant engineer, with headquarters at Savanna, Ill., has been promoted to division engineer, with the same headquarters. Both of these positions are newly created.

**Leon P. Rossiter,** division engineer on the Lehigh Valley, with headquarters at Buffalo, N. Y., whose promotion to resident engineer on grade elimination work in the State of New York, was noted in the April issue, was born on September 11, 1877, at Meadville, Pa., and was educated at Allegheny College, where he graduated in 1899. He entered railway service in the same year as a rodman on the Baltimore & Ohio, and in 1902 was promoted to assistant division engineer, with headquarters at Pittsburgh, Pa. This was followed in 1904 by his promotion to division engineer, with headquarters at Winchester, Va., and in 1905 he was transferred to Pittsburgh. He left railway service in September 16, 1910, to accept a position with a contracting firm, but re-entered railway service on April 22, 1913, as an assistant engineer on construction on the Chicago, Rock Island & Pacific, later being transferred to the Minnesota division in the maintenance of way department. He entered the service of the Lehigh Valley on January 1, 1915, as division engineer at Buffalo, which position he was holding at the time of his recent promotion to resident engineer on grade elimination work in the State of New York, with headquarters at Geneva, N. Y.

**T. P. Watson,** whose promotion to principal assistant engineer of the Philadelphia improvements on the Pennsylvania was noted in the March issue, was born on November 21, 1886, at Chester, Pa., and centered railway service with the Pennsylvania in July, 1902. From January, 1903 to January, 1918 he was successively chainman rodman, levelman and transitman on location and construction under the direction of the office of the chief engineer of the lines East. From January, 1918, to July, 1919, Mr. Watson was a captain in the Transportation Corps of the A. E. F., and was engaged in the location and construction of railways and dock facilities in France. At the termination of his military service he re-entered the service of the Pennsylvania as an assistant engineer, in the chief engineer's department of the Eastern and Central regions, which position he was holding at the time of his recent promotion to principal assistant engineer on the Philadelphia improvements.

T. P. Watson

### Changes on the Boston & Maine

The engineering, construction, valuation, maintenance of way and signal departments of the Boston & Maine have been consolidated and placed under the direction of **W. J. Backes,** formerly engineer maintenance of way, with headquarters at Boston, Mass., who has been promoted to the

newly created position of chief engineer, with headquarters at the same place, reporting to the president. **Frank C. Shepherd,** chief construction engineer at Boston, has been appointed consulting engineer, reporting to the chief engineer. **William F. Cummings,** auditor and valuation engineer at Boston, has been appointed engineer maintenance of way, with headquarters at the same place, succeeding Mr. Backes. **C. J. Griffin,** real estate engineer at Boston, has been promoted to principal assistant engineer and will assume the duties heretofore pertaining to the electrical engineer, architect and real estate engineer, these offices having been abolished. **Guy H. Watson,** division engineer of the Portland division, with headquarters at Salem, Mass., has been promoted to assistant to the engineer maintenance of way, with headquarters at Boston, and **Joseph A. Parant** has been appointed engineer of standards, with headquarters at Boston, reporting to the engineer maintenance of way. **Timothy G. Sughrue,** supervisor of bridges and buildings on the Portland division, with headquarters at Salem, Mass., has been promoted to division engineer, with headquarters at the same place, succeeding Mr. Watson. **Mr. I. N. Benson** has been appointed supervisor of work equipment, with headquarters at Boston, reporting to the engineer maintenance of way.

Mr. Backes was born on April 29, 1879, at Hartford, Conn., and graduated from Sheffield Scientific School in 1899, receiving the degree of C. E. from the Pennsylvania Military College in 1919. He entered railway service in July, 1899, as a rodman on the Mexican International (now a part of the National Railways of Mexico) and later was promoted to levelman. From September, 1900, to December of the same year he was assistant foreman for the American Dry Kiln Company in Mexico, returning to railway service in February, 1901, as an assistant on an engineering corps on the western lines of the Pennsylvania. From July, 1902, to July, 1903, he was a transitman on the Pennsylvania, when he entered the service of the New York, New Haven & Hartford, in the same capacity. He became an assistant engineer on the New York, Pennsylvania & New Jersey in April, 1905, and was appointed chief engineer of the Central New England in May, 1906. On March 1, 1913, he was made engineer maintenance of way of the same road and the New York, New Haven & Hartford, and was promoted to assistant general manager in 1923. He was appointed engineer maintenance of way of the Boston & Maine on February 1, 1926, which position he was holding at the time of his recent promotion to chief engineer.

Mr. Griffin was born on May 25, 1882, at Everett, Mass., and graduated from the Massachusetts Institute of Technology in 1904. He entered railway service on October 21 of the same year as an inspector on the Boston & Maine, remaining in that position until December, 1906 when he became a transitman on the New York, New Haven & Hartford. He returned to the Boston & Maine as an assistant engineer on May 1, 1911, and served as division engineer of construction from February, 1913, to February, 1914, following which he was appointed assistant engineer of valuation, serving in this capacity until August, 1918. At the latter time he became construction engineer, remaining in that position until August, 1924, when he entered the maintenance of way department, and in June, 1926, he was promoted to real estate engineer, which position he was holding at the time of his recent promotion to principal assistant engineer.

Mr. Sughrue was born at Nashua, N. H., on February 22, 1889, and after attending the University of New Hampshire he entered railway service with the Boston & Maine as a chainman, being promoted subsequently to the positions of rodman and transitman in the office of the chief engineer. On November, 1911, he was transferred as transitman to the office of the division engineer at Nashua, N. H., where he served until July, 1914, when he was promoted to division foreman of bridges and buildings with the same headquarters. In March 1918, Mr. Sughrue was appointed supervisor of bridges and buildings on the W. N. & P. division with headquarters at Nashua and in January, 1925, was transferred to the Portland division, with headquarters at Salem, Mass. He was holding this latter position at the time of his recent promotion to division engineer.

## Track

**F. L. Culver,** supervisor on the Albany division of the Boston & Albany since 1907, with headquarters at Springfield, Mass., has retired after 43 years continuous service with that road. **F. H. C. Groves,** assistant supervisor on the same division, has been promoted to supervisor to succeed Mr. Culver, and **William Reardon,** section foreman at Springfield, has been promoted to assistant supervisor to succeed Mr. Groves.

**R. L. Grubb,** acting roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Abilene, Kan., has been promoted to roadmaster. **J. W. Soward,** section foreman, has been promoted to acting roadmaster on the Augustine and Longview districts of the Gulf, Colorado & Santa Fe, with headquarters at San Augustine, Tex., where he replaces **M. M. Killen,** who has been transferred to the Somerville and Conroe districts, with headquarters at Conroe, Tex., to succeed **A. L. Koonce,** deceased.

**H. H. Fisher,** section and extra gang foreman on the Illinois Central at Makanda, Ill., has been promoted to supervisor on the St. Louis division, with headquarters at Carbondale, Ill., to replace M. J. Connerton, who has been transferred to the Chicago terminals to succeed **Martin Costanza,** resigned. **W. H. Hudson,** extra gang foreman on the Memphis division has been promoted to supervisor on the Vicksburg Route of the I. C., with headquarters at Monroe, La., where he succeeds **P. Moyels,** who has been transferred to Vicksburg, Miss., to take the place of **O. R. McIlhenny,** resigned.

**C. B. Arnold** has been appointed roadmaster on the Dallas division of the Houston & Texas Central line of the Southern Pacific, with headquarters at Ennis, Tex., to succeed **J. A. Gude,** whose transfer to the chief engineer's office at Houston, as assistant engineer, is noted elsewhere in this issue. **J. N. Fuller** has been appointed acting roadmaster on the Galveston, Harrisburg & San Antonio, with headquarters at Giddings, Tex., to replace **R. E. Dell,** who has been transferred to Skidmore, Tex., succeeding **J. P. Domas,** who has been assigned to other duties. **H. G. Kornegay** has been appointed roadmaster on the Houston East & West Texas, with headquarters at Lufkin, Tex., to succeed **R. R. Blankenship,** assigned to other duties.

**C. A. Drawheim,** roadmaster on the Janesville line of the Chicago, Milwaukee & St. Paul, with headquarters at Milwaukee, Wis., **J. P. Whalen,** roadmaster on the Madison division with headquarters at Madison, Wis., and **J. T. Loftus,** roadmaster with headquarters at Wausau Wis., have been placed in charge of the three district rail laying gangs, in line with the policy of the C. M. & St. P., of putting these gangs under the direct supervision of roadmasters. **Wm. Hickey,** assistant roadmaster, with headquarters at Madison, Wis., has been promoted to roadmaster, with the same headquarters to succeed Mr. Whalen and **W. T. McNamara,** has been appointed roadmaster to succeed Mr. Drawheim, at Milwaukee. **T. F. Hyson,** section foreman on the Dubuque division, has been promoted to roadmaster of that division with headquarters at Dubuque, Iowa, to succeed **N. F. Kelsey,** who has been transferred to the C. & M. division, with headquarters at Milwaukee, Wis., in the place of **C. F. Allen,** promoted to division engineer.

**H. A. Bowden,** acting roadmaster on the Edson division of the Alberta district of the Canadian National, with headquarters at Edson, Alta., has been appointed roadmaster, with headquarters at the same place. **Charles Gosselin,** acting roadmaster on the Canadian National at Richmond, Que., has been promoted to roadmaster with headquarters at Levis, Que. Mr. Gosselin was born in St. Anastasie, Megantic county, Que., on April 29, 1874, and entered railway service with the Grand Trunk (now part of the Canadian National) as a trackman on May 1, 1893. On May 1, 1900, he was promoted to section foreman at Craigs Road, Que., and on April 1, 1903, was transferred to Chaudiere, Que. From this date until July 2, 1926, Mr. Gosselin acted in this capacity and also served as plow and flanger foreman during the winters and as an extra gang foreman during the summers. On the latter date he was promoted to acting roadmaster at Richmond and on August 1 of the same

year was transferred to Levis, Que., which position he was holding when recently promoted to roadmaster, with headquarters at Levis, Que.

**T. E. Casteel,** yard foreman on the Chicago, Burlington & Quincy at St. Joseph, Mo., has been promoted to roadmaster on the Chariton-St. Joseph line, with headquarters at Albany, Mo., to succeed **J. R. Caldwell,** who has been transferred to Cameron, Mo., to replace **R. L. Sims,** whose promotion to district engineer maintenance of way on Lines West is noted elsewhere in this issue. **Lewis Griggs,** instrumentman on the Beardstown division, has been promoted to roadmaster on the Galesburg to Rushville and Galva to Gladstone lines of the Galesburg division, with headquarters at Galesburg, Ill., succeeding **John King,** who has retired. **John Fyalco,** section foreman at Streator, Ill., has been promoted to roadmaster on the Streator to Denrock and Mendota to Walnut lines of the Aurora division with headquarters at Streator, a newly-created position. **C. R. Schoenfield** has been appointed assistant roadmaster on the Aurora division, with headquarters at Aurora, Ill., and will have jurisdiction over the crossing flagmen between Chicago and Aurora.

## Bridges and Buildings

**Charles Eisele** has been appointed general supervisor of bridges on the New York Central, Lines West of Buffalo, to succeed **George E. Bitz,** notice of whose death appeared in the April issue.

## Purchasing and Stores

**J. C. Daniels** has been appointed storekeeper of the Richmond car works of the Chesapeake & Ohio, succeeding **J. F. Topping,** who has been assigned to other duties.

**W. A. Prueit** has been appointed stationery storekeeper on the Chesapeake & Ohio, with headquarters at Richmond, Va., succeeding **W. B. Smethie,** resigned.

**F. C. Krell,** has been appointed forester of the Pennsylvania, with headquarters at Philadelphia, Pa., succeeding **H. R. Condon,** who has resigned to become general manager of the American Mond Nickel Company, with headquarters at Pittsburgh, Pa.

**H. R. Duncan,** inspector of stores on the Chicago, Burlington & Quincy, with headquarters at Chicago, has been promoted to traveling storekeeper to succeed **C. J. Mackie,** who has resigned. **O. A. Schultz,** chief lumber inspector, with headquarters at Chicago, has been appointed inspector of stores, with headquarters at the same place, to succeed Mr. Duncan.

**H. O. Wolfe,** assistant general storekeeper on the Chicago & Alton, with headquarters at Bloomington, Ill., has been promoted to general storekeeper, with headquarters at the same place, to succeed **F. C. Riley,** who has been granted a leave of absence because of ill health. **E. L. Murphy,** traveling storekeeper, with headquarters at Bloomington, has been promoted to assistant general storekeeper to succeed Mr. Wolfe.

## Obituary

**H. H. Pollock,** assistant master carpenter on the Pennsylvania, with headquarters at Carnegie, Pa., died on April 10.

**W. L. Ekin,** chief engineer maintenance of way of the Western region of the Pennsylvania, with headquarters at Chicago, died suddenly at his office on April 28.

**Howard Sexton,** roadmaster on the Delaware, Lackawanna and Western, with headquarters at Stroudsburg, Pa., died at his home in East Stroudsburg on April 16, 1927. Mr. Sexton was born on June 6, 1872, at Washington, N. J., and entered the service of the Lackawanna as a waterboy in 1883, following which he became a fireman in 1887 and took charge of an extra gang and work train in 1894. He was placed in charge of a switch gang at Washington, N. J., in 1899, promoted to supervisor at Stroudsburg in 1910, and was further promoted roadmaster with the same headquarters in 1915, which position he was holding at the time of his death.

**A. S. Going,** terminal engineer of the Canadian National, with headquarters at Montreal, Que., died in that city on March 21. Mr. Going was born on April 7, 1860, at Portland, Ore., and was educated at Lafayette College. He entered railway service in June, 1880, as an instrumentman on the Oregon Railway & Navigation Company and in 1881 became an assistant engineer on the Northern Pacific, serving in this capacity until 1883. From 1884 to 1886 he was assistant engineer on the Oregon Pacific (now a part of the Southern Pacific) and in 1887 and 1888 he was resident engineer on the Seattle, Lake Shore & Eastern (now a part of the Northern Pacific), after which he returned to the Northern Pacific as assistant engineer. Mr. Going was in private practice in the State of Washington and in British Columbia from 1890 to 1902, when he returned to railway service as division engineer on the lines of the Great Northern in British Columbia. In 1904 he became exploratory engineer for the Grand Trunk Pacific (now a part of the Canadian National) in British Columbia, and in the following year was made division engineer on the Minneapolis & St. Louis. From 1907 to 1912 Mr. Going was locating engineer for the Grand Trunk (now a part of the Canadian National) and on December 1, 1912, he was promoted to engineer of construction, with headquarters at Montreal. In May, 1923, he was promoted to terminal engineer of the Canadian National and was holding this position at the time of his death.

**George H. Bremner,** formerly district engineer on valuation for the Inter-state Commerce Commission, with headquarters at Chicago and for 16 years treasurer of the American Railway Engineering Association, died on April 2 at his home at La Grange, Ill., after an illness of nearly three years. Mr. Bremner was born on December 17, 1861, at Marshalltown, Iowa, and was educated at the University of Iowa where he graduated in 1883. He entered railway service as a draftsman on construction on the Chicago, Burlington & Quincy during his college vacation in 1880 and after the completion of his college course in 1883 he became a rodman on the construction of the Chicago, St. Paul & Kansas City (now the Chicago Great Western), serving in this capacity until September of the same year, when he became a transitman on maintenance of way on the Chicago & North Western. In May, 1884, Mr. Bremner returned to the Burlington as a transitman on preliminary surveys and a draftsman on construction, and in December, 1885, he was promoted to division engineer maintenance of way. From April, 1889, to June, 1900, he was a transitman in charge of the location of the St. Louis, Keokuk & Northwestern (now a part of the Burlington), between Old Monroe, Mo., and St. Louis, following which he was promoted to assistant engineer on maintenance of way, with headquarters at Chicago. In June, 1902, he was promoted to engineer of the Illinois district and in November, 1904, he was promoted to engineer maintenance of way of the same district. In April, 1908, he was made district engineer of the Illinois district, resigning this position on February 1, 1914, to become assistant district engineer, Central district, division of valuation of the Interstate Commerce Commission, with headquarters at Chicago. In 1916, he was promoted to district engineer, in which position he remained until November 30, 1921, when the district offices were closed, after which he returned to the engineering staff of the Burlington at Chicago. He retired from active service in 1924, on account of ill-health. Mr. Bremner was elected treasurer of the American Railway Engineering Association in 1911 and served continuously in that capacity from that date until the time of his death.

George H. Bremner

# Construction News

**The Atchison, Topeka & Santa Fe** has acquired ground and plans are in the course of preparation for the construction of a general office building at Amarillo, Tex.

Plans have been prepared for the construction of an addition to the enginehouse at Slaton, Tex., consisting of six stalls, 124 ft. in length, including engine pits, provided with water, air, steam and boiler washing lines. This company will also construct a frame engine-house at Isom, Tex., 96 ft. by 208 ft. with concrete engine pits. This installation also includes two additional locomotive sidings.

The construction of an earth dam with a concrete core wall is planned at Augusta, Kan., to form a reservoir which will have a capacity of 462,000,000 gal. of water. To carry the water from the reservoir, which is located north of Augusta, to the yard and terminal at Augusta it is planned to construct a 12-in. gravity supply line 33,700 ft. long. A pumphouse, treating house and tank, storage tank, service tank and water cranes will be constructed at Augusta yard.

**The Atlantic Coast Line** has contracted with Roberts & Schaefer Company, Chicago, for the installation of a junior "N & W" type cinder handling plant at Pinners Point, Va.

**The Baltimore & Ohio** is making plans for improving its terminal facilities at Baltimore. The plans include the building of a new station at a cost of about $8,000,000. Plans also involve adjustments of street approaches and the construction of a viaduct, concerning which representatives of the road are now conferring with representatives of the City of Baltimore. A contract has been awarded to the Vang Construction Company, Cumberland, Md., for constructing a second main track and a concrete arch at Germantown, Md., at a total cost of about $500,000.

**The Boston & Albany** has awarded contract for a coaling and sanding plant at Worcester, Mass., to the Fairbanks, Morse & Co. of Chicago.

**The Canadian National** has awarded a contract to N. McLeod, Ltd., Toronto, Ont., for the construction of a 300-ton reinforced concrete coaling station at Paris Junction, Ont.

Bills to construct 15 branch lines in the next three years at an aggregate cost of about $20,000,000, have passed the House and the Senate at Ottawa and been signed by the Governor General. There was little or no opposition to these measures this year, in contrast to the difficult road they had to travel in 1924.

**The Chicago, Milwaukee & St. Paul** has been authorized by the Federal court at Chicago to replace a bridge over the Grand river at Chillicothe, Mo., to cost about $87,000; to construct an addition to the power house and machine shop at Channing, Mich., to cost $31,000; and to construct a spur track and warehouse at Seattle, Wash., to involve an expenditure of about $56,000.

**The Chicago, Rock Island & Pacific** has authorized the construction of second main track between Earlsboro, Okla., and Lima, 15 miles, and additional passing tracks at Tracy, Okla., Tidmore, Seminole, Lima, Wewoka, Holdenville, Agua, Tecumseh Junction, El Reno, Stuart, Calvin, Shawnee, Harrah, Dickson, Oklahoma City, Council, Yukon and Banner to handle the oil traffic in this section. Bids will be asked for grading while the laying of tracks will be done by company forces.

**The Clinton & Oklahoma Western** has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Cheyenne, Okla., across the Texas state line to a point near Pampa, Tex.

**The Denver & Rio Grande Western** has awarded a contract to the Utah Construction Company, for revision of the line between Mack, Colo., and West-Water, Utah, 16 miles, at an approximate cost of $539,000. Another contract has been awarded to the Platt, Rogers Construction Company, covering the revision of line between Parkdale, Colo., and Cleora, 42 miles, at a cost of about $750,000. Bids have been requested by this company for line revisions between Minturn, Colo., and Eagle, 26 miles, between Brown Canon, Colo., and Buena Vista, three miles and in the vicinity of Husted, Colo., two miles.

**The Georgia & Florida** has let a contract for the construction of a 57-mile extension from Augusta, Ga., to Greenwood, S. C., at which point a connection will be made with the Southern, Seaboard Air Line and the Piedmont & Northern.

**The Grand Trunk Western** contemplates the construction of a freight classification yard of 4,000 cars' capacity on the line of its subsidiary, the Detroit, Grand Haven & Milwaukee, at Detroit, Mich. The yard will be operated in conjunction with the recently constructed yard at Pontiac, Mich., and in future all freight will move into Detroit, from Pontiac, by means of transfer engines. Including a 20-stall enginehouse, a coaling station, a water station and facilities for light running repairs, the yard at Detroit will involve a total expenditure of about $1,000,000. The yard will be constructed by company forces, although the enginehouse and other buildings will be built by contract.

**The Indiana Harbor Belt** has awarded a contract for the construction of a junior "N & W" type combined engine coaler and cinder handling plant at Argo, Ill., to Roberts & Schaefer Company, Chicago.

**The Kansas City, Mexico & Orient** has awarded a contract to John S. Cates for the construction of a passenger station at Ft. Stockton, Tex., at a cost of about $30,000.

**The Louisville & Nashville** expects to let a contract soon for the construction of a freight house at Mobile, Ala.

The Interstate Commerce Commission assigned this company's application for authority to construct a new line in Harlan county, Ky., and to operate under trackage rights over the Interstate Railroad, to connect its lines with those of the Carolina, Clinchfield & Ohio, for oral argument on April 18 before Division 4.

**The Missouri-Kansas-Texas** has been granted the right to construct an extension into the South Dallas, Tex., industrial district at a cost of about $100,000.

**The Missouri Pacific** closed bids on April 6 for the construction of a reinforced concrete automatic electric coaling station at Osawatomie, Kan. This station will consist of two bins, one of 450 tons' capacity and the other of 100 tons' capacity.

**The New York, New Haven & Hartford** has awarded a contract to Roberts & Schaefer Company, Chicago, for the installation of two sand handling and drying plants at Lowell, Mass., and Fall River, and for the construction of a five-track reinforced concrete coaling and sanding plant at Cedar Hill Yard, New Haven, Conn. This plant will have a capacity of 2,400 tons with automatic electric elevating skips of a capacity of 150 tons per hour.

This company has awarded to Henry R. Kent & Co., Rutherford, N. J., a contract for the construction of a central boiler plant at New Haven, Conn., to cost approximately $500,000. The relocation of two main line tracks at Harlem river, New York City, to cost approximately $250,000, in preparation for a projected yard extension, has been authorized.

**The New York Central** has awarded a contract to the Tucker Construction Company, Inc., New York, for the construction of a driveway and loading platform above the 43rd street driveway, and also a contract for alterations to the receiving room of the Hotel Commodore in New York. Another contract has been awarded to the M. F. Kelly Building Corporation, New York, for the construction of elevator shaftways, platforms, canopies and overhead meat transfer tracks at packing houses in New York.

The Public Service Commission of New York has ordered the elimination of the highway grade crossing at County highway No. 677 in Carman, N. Y., and has directed the railroad company to prepare plans and specifications; estimated cost $214,000. A five-span through plate girder bridge to be built over the railroad will be about 255 ft. long.

**The Pennsylvania** has awarded a contract for the construction of a simplex automatic electric coal handling plant at South Amboy, N. J., to Roberts & Schaefer Company, Chicago.

A contract has been awarded to the W. F. Trimble & Sons Co., of Pittsburgh, Pa., for the construction of a station and express building at Uniontown, Pa., which, it is estimated, will cost $100,000. Plans are also being made for the construction of bridges at Massillion, Ohio, which are estimated to cost $100,000.

**The Pere Marquette** has planned a program of construction and improvements for the current year, which includes grade separation work at Michigan avenue and Miller road, Detroit, at a cost of $320,000 and the completion of the Schaefer road project in Fordson which will involve a further expenditure of $260,000. Expenditures for shops and engine houses will total $190,500, of which about $168,000 will be used in the extension and remodeling the facilities at Saginaw, Mich. Passing tracks and sidings call for a total of $363,000, while yard extensions will involve an outlay of $314,500, a considerable portion of which will be at Detroit. An outlay of $90,000 for water plants and coaling stations at various points is contemplated; the miscellaneous building program will cost about $92,000, and bridges, trestles and culverts will require an expenditure of $66,600.

**The St. Louis-San Francisco** has awarded a contract to the Gerhardt Construction Company, Cape Girardeau, Mo., for the construction of a one-story tile and stucco passenger station, with outside dimensions of 158 ft. by 30 ft., at Holly Springs, Miss., estimated to cost $45,000.

**The Southern** has awarded contracts for 10 new coaling stations with sand facilities to Fairbanks, Morse & Co., as follows: Monroe, Va., Columbia, S. C., Atlanta Junction, Ga., Bulls Gap, Tenn., Coster, Tenn., Sheffield, Ala., Anniston, Ala., Jacksonville, Fla., Lawrenceburg, Ky., and Winston-Salem, N. C. The stations range from 300-tons to 1,000-tons capacity. The same company was also awarded a contract for six Universal electric type conveyors to be located at Columbia, S. C., Altanta Junction, Ga., Winston-Salem. N. C., and Jacksonville, Fla.

**The Southern Pacific** closed bids on April 11 for the construction of a concrete mud shed, 800 ft. long, one mile south of Ciuzette, Ore., on the Natron cut-off on the west approach to the crossing of the Cascade mountains. This shed, which will be 25 ft. high and 17 ft. wide, will serve as a protection against landslides which have been frequent at that point. The cost is expected to be about $185,000.

A contract has been let to the Ware Company, El Paso, Tex., for the construction of a Spanish type hollow tile and stucco passenger station at McAllen, Tex., to cost approximately $37,000. Plans are being prepared for the construction of combined freight and passenger stations of the Spanish Renaissance style at Azahar, Tex., La Blanca, Elsa, Las Velia, Santa Rosa and Primera, on the new line between Edinburg and Harlingen, and at Encano, Rachal, Dix, Linn, Solino and Alsonia, on the new line between Falfurrias, Tex., and Edinburg.

**The Texas & Pacific** has awarded a contract to the Austin Company, Cleveland, O., for the construction of buildings at the new freight terminal, yard and shops at Fort Worth, Tex. Track laying will be done by company forces and approximately $2,500,000 will be spent on the entire project during 1927. A contract for the construction of a brick combination freight and passenger station at Wills Point, Tex., has been awarded to F. A. Mote, Dallas, Tex., at a cost of about $50,000.

**The Virginian** has let a contract for the superstructure of the bridge at mile posts 90.0 and 52.7 to the Virginian Bridge and Iron Company and a contract for the substructure to W. W. Boxley & Company.

**The Wabash** closed bids on April 20 for the construction of a one-story brick and passenger station at Excelsior Springs, Mo., with outside dimensions of 24 ft. by 70 ft., estimated to cost about $25,000.

Plans have been prepared for the construction of a steel and concrete viaduct to carry the tracks of this company across Vandeventer avenue at Market street, St. Louis, Mo. The new structure, to replace one now in service, will be made necessary by the widening of Vandeventer avenue from 60 ft. to 100 ft.

# Supply Trade News

## General

**The Robert W. Hunt Company** has moved its Pittsburgh, Pa., office and laboratories from the Monongahela Bank building to the Professional building.

**Mudge & Co.**, Chicago, has awarded contracts for an addition to their manufacturing plant at Chicago, which will double the capacity of the present plant.

**The Verona Tool Works**, Pittsburgh, Pa., has removed its general offices to 1704 First National Bank building in that city. After May 1 its Chicago offices will be located at 607 Railway Exchange building.

**The Air Reduction Company, Inc.**, New York, has acquired the **Interstate Oxygen Company**, a West Virginia corporation with oxygen plants at Wheeling, W. Va., and Portsmouth, Ohio, and the **Compressed Gas Manufacturing Company**, also a West Virginia corporation with an acetylene plant at Huntington, W. Va.

**The Reed-Prentice Corporation**, Worcester, Mass., has arranged with the following dealers on the Pacific Coast to act as sales representatives for the Wolf portable link sawing machine: the **Shaw-Palmer-Bakewell Company**, Los Angeles, Cal.; the **A. L. Young Machinery Company**, San Francisco, Cal., and **P. Sinnock & Co.**, Portland, Ore.

**Fairbanks, Morse & Company**, Chicago, has purchased the scale business of the **Fairbanks Company**, New York, thus giving the former company complete control of the manufacturing and distribution of Fairbanks scales, including a manufacturing plant at Birmingham, England, and a sales agency at London, England. The scale factories of E. & T. Fairbanks & Company at St. Johnsbury, Vt., and East Moline, Ill., were purchased by Fairbanks, Morse & Company in 1916, but the Fairbanks Company retained the distributing rights for Fairbanks scales in the east and south and also in foreign countries.

## Personal

**Wilber Hattery** has been appointed vice-president of the Mickle Timber & Lumber Company, Portland, Ore., with headquarters at Chicago.

**A. L. Bliss**, district sales manager for the Buda Company, Chicago, in charge of the southeastern territory, has removed his headquarters from Jacksonville, Fla., to Atlanta, Ga.

**C. H. White**, manager of the New Orleans office of the **Brown Hoisting Machinery Company**, Cleveland, Ohio, has been transferred to Chicago and has been succeeded by **W. T. Simpson** of the Cleveland, Ohio, office.

**H. R. Condon**, forester of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed general manager of the American Mond Nickel Company, with headquarters in the Century building, Pittsburgh, Pa.

**Alexander Laughlin** was elected to the office of chairman of the board of the Verona Tool Works, a newly created position, at the annual meeting held on April 12, and **W. L. Mellon** was elected a director to fill the vacancy caused by the death of **Alexander Laughlin, Jr.** No other changes were made in the officers or directors.

**Roy C. Violett**, whose appointment as sales representative of the railway appliances division of the American Fork & Hoe Company, Cleveland, Ohio, with headquarters at Denver, Colo., was noted in the April issue, entered railway service in the maintenance of way department of the Chicago, Burlington & Quincy and was promoted to roadmaster in 1906, with headquarters at Centralia, Ill., later being transferred to the Galesburg division and to the Aurora division successively, having charge of the main line between Chicago and Mendota, Ill., on the last named division. On October 1, 1917, he was appointed division roadmaster on the St. Louis Southwestern, with headquarters at Mt. Pleasant, Tex. In April, 1918, he was ap-

pointed general roadmaster of the Denver & Rio Grande Western, with headquarters at Denver, Colo., and in October, 1923, was appointed division engineer on the same road, with headquarters at Pueblo, Colo. In March, 1925, he resigned this position to take up engineering and contracting, in which occupation he was engaged until the time of his recent appointment as sales representative of the railway appliances division of the American Fork & Hoe Company.

**Joshua A. Hatfield,** vice-president of the American Bridge Company, with headquarters at New York, has been elected president to succeed **August Ziesing,** retired. **L. A. Paddock,** president of the Canadian Bridge Company, Walkerville, Ont., has been elected vice-president of the American Bridge Company, and Frank B. Thompson, auditor, has also been elected a vice-president. Mr. Hatfield became connected with the Pottstown Iron Company, Pottstown, Pa., in 1880, remaining with that company for 16 years and was general sales agent during the last 5 years of that period. From 1896 to May, 1900, he was an executive of the A. & P. Roberts Company, Pencoyd Iron Works, Philadelphia, Pa., and in the latter year was made assistant to the president of the American Bridge Company. Mr. Hatfield has been a director of the American Bridge Company from its foundation in 1900 and until 1914 was president of the American Bridge Company of New York, which was consolidated with the American Bridge Company of New Jersey, the present company. His election as president was effective April 1.

Joshua A. Hatfield

**Colonel H. C. Boyden** has joined the staff of the Celite Products Company, Los Angeles, Cal., as a lecturer in concrete design and construction. Colonel Boyden was born on April 23, 1873, and was educated at Worcester Polytechnic Institute where he graduated in 1894. He entered railway service in the same year as an assistant engineer on the Boston & Albany, and served in a similar capacity successively on the New York Central and the Delaware, Lackawanna & Western until 1908, when he became an inspector in the United States reclamation service. He was an assistant engineer on the Atchison, Topeka & Santa Fe from 1909 to 1911, when he became a resident engineer with the Los Angeles county highway commission, leaving this position in 1912 to act in a similar capacity for the California highway commission. Mr. Boyden became an assistant engineer for the J. G. White Engineering Corporation in 1915 and in the following year returned to the California highway commission as a resident engineer, which position he left to become an assistant engineer on the valuation of the United Railroads of San Francisco. He entered military service in 1917 as a captain of engineers and was later promoted to major, teaching in the engineering school at Camp Humphries in 1919. At the termination of his military service he became a lecturer for the Portland Cement Association, and in 1925 he was made dean of the College of Engineering of the Ohio Northern University.

H. C. Boyden

**W. S. Hovey,** vice-president and general manager of Fairbanks, Morse & Company, Chicago, has been elected president and general manager, succeeding **C. H. Morse** as president, the latter having been elected chairman of the board. **R. H. Morse,** first vice-president, has been elected vice-chairman of the board. **W. E. Miller,** vice-president and treasurer, has relinquished the duties of treasurer to replace Mr. Hovey as vice-president, and **F. M. Boughey,** secretary and controller, has succeeded Mr. Miller as treasurer. Mr. Hovey was born in 1875 and graduated from Cornell University, after which he entered the employ of the Sheffield Car Company, affiliated with Fairbanks, Morse & Company, as assistant superintendent. He remained in this position until 1913 when he was transferred to the Beloit works of Fairbanks, Morse & Company as manager of the engine division and later in the same year he was elected vice-president in charge of all the manufacturing activities. In 1924 he was made general manager of the entire business, which position he was holding at the time of his recent election to president.

W. S. Hovey

## Trade Publications

**No-Freeze.**—The A. C. Horn Co., Long Island City, N. Y., has recently issued a number of circulars setting forth the merits of its product, "No-Freeze," a liquid designed to lower the freezing point of concrete and also to increase its workability and to accelerate its setting.

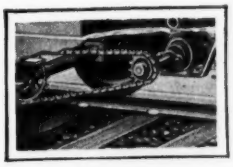
**Interlocking Concrete Cribbing.**—The R. C. Products Company, Cleveland, Ohio, in a 16-page booklet just issued, describes the advantages of its interlocking concrete crib units for the construction of either permanent or temporary retaining walls. The booklet is illustrated with installations by different railroads in various parts of the country and the construction of the units, together with the method of erection, are shown in detail.

**Specifications for Rails and Fastenings.**—The Robert W. Hunt Company, Chicago, has prepared for distribution an 82-page booklet containing the specifications of the American Railway Engineering Association and the American Society for Testing Materials for open hearth carbon steel rails, carbon steel tee and girder rails, joint bars, track bolts of carbon and alloy steel, track spikes, steel and wrought iron tie plates, and spring washers. The booklet is attractively prepared and brings together in convenient form the standard specifications for track materials.

**Instructions for Use of Track Liners.**—The Hackmann Railway Supply Company, Chicago, has issued a chart 22 in. by 28 in., suitable for posting in a tool house, which shows by diagrams, photographs and printed instructions, the proper method of lining turnouts and slip switches, as well as swings and kinks in track, by the use of track liners. The instructions give specific directions as to the number of liners to be employed and the location and method of placing the liners for each operation. The use of liners for other operations, such as raising low joints, spacing ties and throwing skeleton track, is also shown by illustrations.

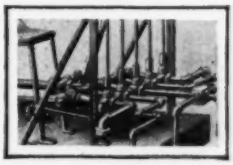
# Precision Work with Weed Killing Chemicals

CHIPMAN Spray Apparatus will give consistent uniformity and eliminate errors in application work. The season of 1927 will show the following improvements on the spray apparatus:



**1st** A positive pressure pump will be driven from the axle so that the volume and pressure will be in exact accordance with the speed of the train for the delivery of the proper amount of chemical per mile.

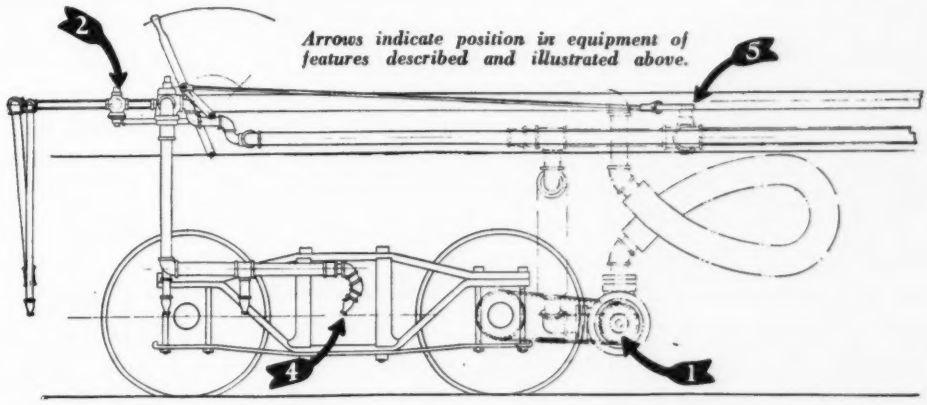
**2nd** The transverse section spray heads will be independently regulated with three-way-cocks so that when a sectional spray head is turned on or off it will not interfere with the pressure or volume discharged from the other spray heads.



**3rd** The spray apparatus by these mechanical means will unfailingly deliver a weed killing dosage under all circumstances of speed and produce uniform results.

**4th** Nozzles will be compensated for area covered so that less solution is used in the tie area and additional proper amounts used at the extreme edges of the band of treatment.

**5th** Spray trains will be fitted for duplex service so that non-poisonous weed killer will be used where special types of vegetation or cattle hazards exist.




*Arrows indicate position in equipment of features described and illustrated above.*

*Write for descriptive matter*

## CHIPMAN CHEMICAL ENGINEERING CO., INC.

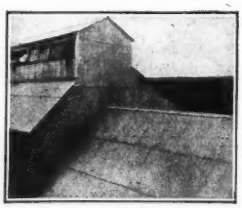
*BOUND BROOK, N. J.*

*Factories:* Bound Brook, N. J. Clearing, Ill. Palo Alto, Cal. Houston, Tex.

ATLAS NON-POISONOUS SERVICE

# TRANSITE CORRUGATED ASBESTOS ROOFING AND SIDING

## *The first cost includes the up-keep*



You never see the gleam of daylight through holes corroded in a Transite Asbestos roof—to remind you that it should have been painted oftener and that it will soon need replacement. Transite never needs painting and never needs replacement because it is literally a sheet of corrugated rock. Made of indestructible asbestos and Portland cement, it can't rust, rot, corrode or burn.

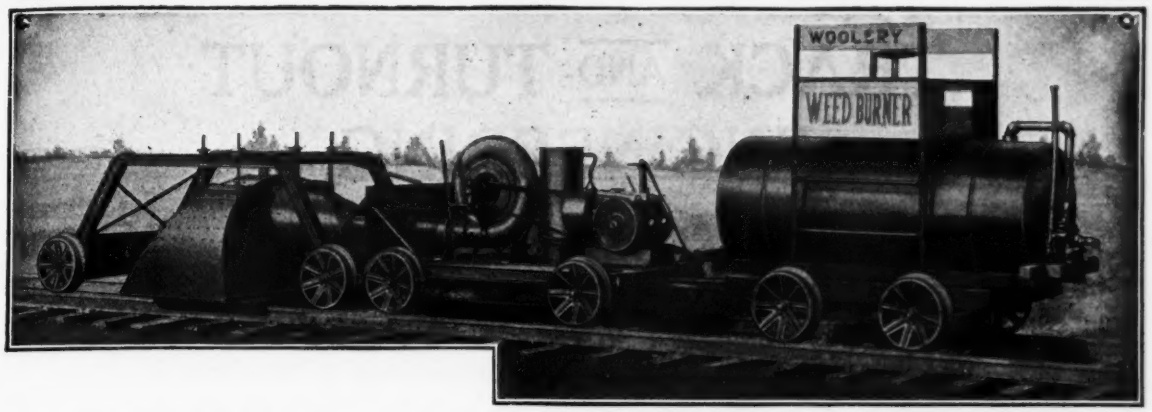
Think of the money this saves. No cost but the first cost—a roofing and siding you can use for as long as the building stands and then take off and use on some other building.

Transite covered buildings never get that worn-out look. They are always ship-shape, weather-tight, and economical.

Through Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

JOHNS MANVILLE CORPORATION, MADISON AVENUE AT 41ST STREET, NEW YORK
BRANCHES IN ALL LARGE CITIES FOR CANADA: CANADIAN JOHNS-MANVILLE CO., LTD., TORONTO

# JOHNS-MANVILLE
## Service to Railroads




Sturdy Chrome Nickel Steel Ball Bearing Axles and Steel Frame support the 575 gallon steel fuel tank. Driver's seat and pilot wheel are on top with all speeds, brake and burner regulating valve controls at hand. Burner fire and car speed easily and simply controlled. Burner self-regulating. Equipped with large capacity pump for quick refilling of tank.

Four wheel drive and six wheel brakes give complete motive control. Powerful twin cylinder Woolery engine furnishes motive power and drives steel pressure blower to produce the blast. Engine reversible enabling outfit to travel in either direction with equal efficiency. Two speed transmission with roller chain and gears. Gears bathed in oil. Speed one to 20 miles an hour.

Specially designed all steel truck with devices for lowering and heightening hood. Efficient steel hood with refractory lining protects fire from wind, retains heat owing to lining and causes a withering heat to be blasted down upon the weeds by the pressure blower.

# $3.00 Per Mile

## FOR BURNING WEEDS

You wouldn't use a sledgehammer to crack a peanut. Neither would you fight weeds with a work train burner nor an army of section hands—after you've learned how the WOOLERY WEED BURNER does a quick, thorough job at small fraction of the cost.

**A Weed Burning Report That Carries Conviction**

| | |
|---|---|
| Lubricating Oil and Other Supplies | $ 2.80 |
| Gasoline—180 gallons | 22.50 |
| Distillate—2866.14 gallons | 114.64 |
| Freight on distillate | 132.42 |
| Repairs (Includes both labor and material) | 53.26 |
| Rental of Equipment (15 days) | 45.00 |
| Wages and Expenses of Operator | 86.56 |
| Wages of Section Men following Burner | 75.60 |
| Total | $532.78 |
| Miles burned | 204 |
| Average cost per mile | $ 2.61 |

# WOOLERY
## WEED BURNER

### Three Units Operated by Two Men

The **Woolery** Three Unit Railway Weed Burner offers greatest economy per mile. Burns gas oil, distillate oil or kerosene. Easily lighted. One large burner blasting tremendous heat completely withers even the tallest weeds for a width of eleven feet.

The **Woolery** averages two miles an hour yet can operate from one to 20 miles per hour on its own power. Blast is easily turned off when crossing bridges or barren spots and relights automatically when fuel is turned on. Carries full day's supply of fuel.

All steel construction on practical designs assures complete safety, strength and durability. Chrome nickel steel ball-bearing axles—strong and easy running. Easily removed from track at highway crossing or loaded on flat car for long hauls.

Low fuel consumption, no oil leakage, four wheel drive and six wheel brakes give great service at low operating cost.

*You need complete WOOLERY Specifications in your Files.*
*Make a Note to Write for them—NOW.*

Before Burning

After Burning

**WOOLERY MACHINE CO. Minneapolis, Minn.**

**Railway Motor Cars—Gasoline Engines—Rail Layer Attachments—Tie Scoring Machines**

# TRACK AND TURNOUT ENGINEERING

By C. M. KURTZ

This is a book of inestimable value to construction engineers, estimators and all others connected with the location and construction of railroads. The text matter is conveniently divided into 18 chapters. There are 260 pages of text and 191 helpful tables. Some of the subjects treated are:

Design of split switches, frogs, slip switches, crossings, turnouts in paved streets, turnouts with divergent tangents, siding connections, yard layouts, crossing layouts and vertical curves. The tables include radii for 100-ft. chords and 50-ft. chords for curves of 30 minutes to 11 degrees, 30 minutes, various dimensions of turnouts from tangents and from outside and inside curves, reverse curve center distances and angles, crossovers, trigonometric formulas, rights of way, acreages, logarithmic tables, trigonometric tables and a table of functions of a one degree curve.

**Over 450 pages**
**191 Tables**
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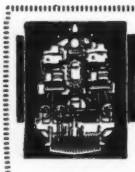

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EXTENSION Side Dump Cars will dump safely any material that can be loaded into them.

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The balanced principle of these cars enables them to dump this material without destructive shock to trestle or equipment.

Extension Side Dump Cars from 35 to 50 yards capacity, are now equipped with pneumatic reversal for two way dumping. Below 35 yards, they will be so equipped on specification.

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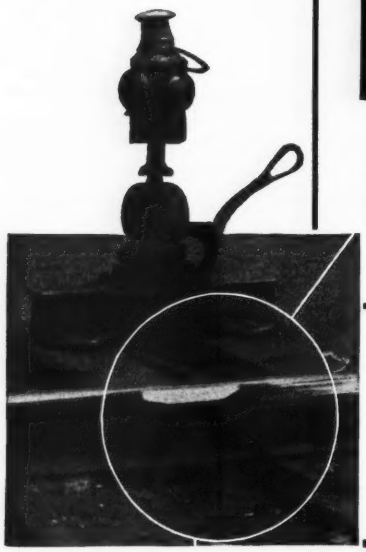

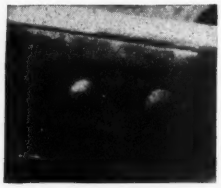

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"Mack" Reversible Switch Point Protectors absorb the wear which ordinarily falls on the switch point — thus giving the switch point five to ten times longer life.

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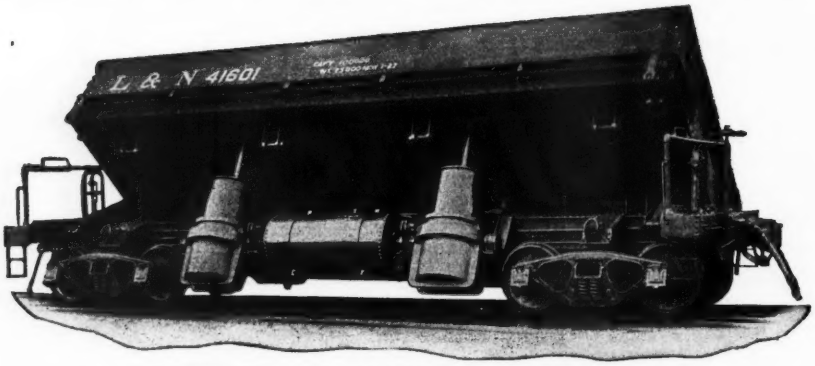


THE KOPPEL TD-27 TRUNNION TYPE DROP SIDE AIR DUMP CAR
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## A Clean, Simple, Powerful Design

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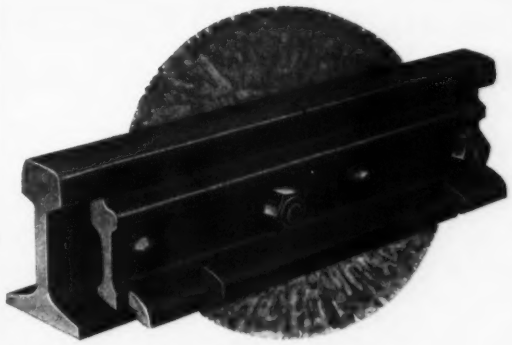

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Extensive and modern facilities, both for manufacture and proper heat treatment, enable us to serve you promptly and efficiently.

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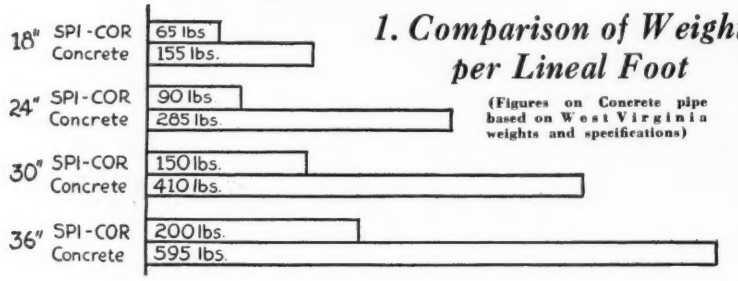
1869

# Comparative Weight and Hauling Cost of Concrete Culvert Pipe vs.

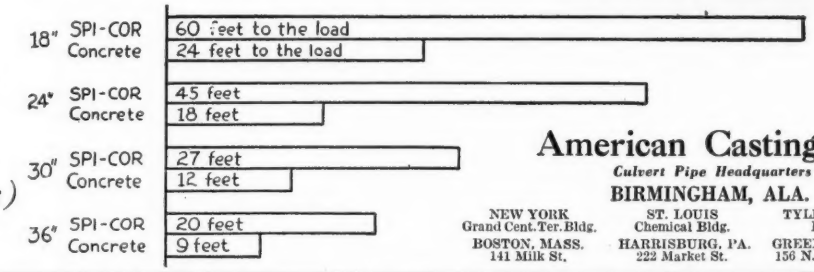
SPI-COR
Cast Iron Spiral Corrugated Culvert Pipe

*1. Comparison of Weights per Lineal Foot*

(Figures on Concrete pipe based on West Virginia weights and specifications)




*2. Comparison of Footage (basis two-ton loads)*


18" SPI-COR 60 feet to the load
Concrete 24 feet to the load
24" SPI-COR 45 feet
Concrete 18 feet
30" SPI-COR 27 feet
Concrete 12 feet
36" SPI-COR 20 feet
Concrete 9 feet

**American Casting Co.**

*Culvert Pipe Headquarters*

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Woodings Track Tools are made by men who have devoted the greater part of their lives to this kind of work. They are all veterans. This knowledge and careful workmanship, together with the use of the best grades of steel that we can obtain, are the causes of our increasing business.

We are receiving new orders every day from Roads pleased with former test orders.

Repeat orders are increasing daily, due to the service our tools are giving.

The Woodings Track Tools are rapidly becoming the Railroads' standard.

We follow your specifications closely and meet all of the requirements of your tests and inspection.

*We respectfully solicit your consideration.*

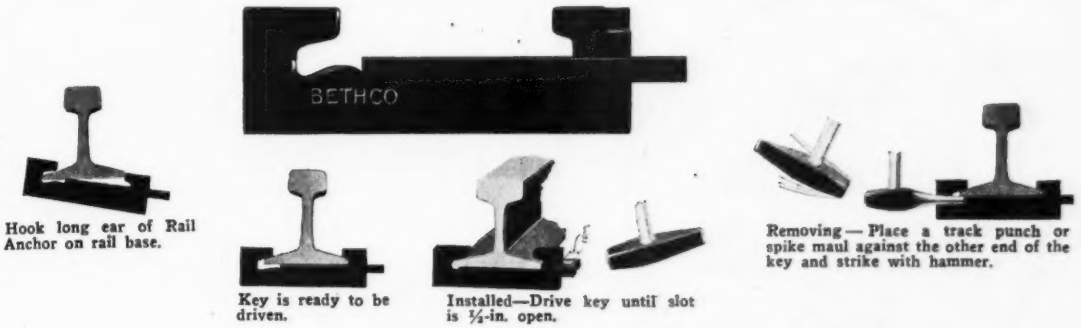
## WOODINGS FORGE & TOOL CO.

**Works and General Sales Office**

**VERONA, PA.**

# *The* Bethco Rail Anchor

Stops the Rail—Stays Put—Easy to Install—Selflocking—Positive Grip—Adjustable, fits new, old, worn and corroded rails.




Hook long ear of Rail Anchor on rail base.

Key is ready to be driven.

Installed—Drive key until slot is ¼-in. open.

Removing—Place a track punch or spike maul against the other end of the key and strike with hammer.

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SNOW PLOW * ICE CUTTER * DITCHER
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An all-year Machine. In use on North America's leading railroads.

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# THERMIT

## What happens to buried rail joints

# WELDING

When rail joints are buried in pavement they are a constant source of trouble and the expense of proper maintenance is almost prohibitive.

These joints can be eliminated by Thermit welding which gives a smooth and continuous rail surface. Welds of this kind will last as long as the rail itself.

The process is simple, the equipment light and inexpensive and your own track men can do the work.

We would be pleased to furnish you with complete information in regard to the process and estimates of the cost of installation.

**METAL & THERMIT CORP.**
**120 BROADWAY, NEW YORK, N. Y.**

PITTSBURGH TORONTO BOSTON
CHICAGO SAN FRANCISCO


STATEMENT of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of *Railway Engineering & Maintenance* published monthly at Chicago, Ill., for April 1, 1927.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared E. A. Simmons, who, having been duly sworn according to law, deposes and says that he is the President of the Simmons-Boardman Publishing Co., publishers of *Railway Engineering & Maintenance* and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Simmons-Boardman Publishing Co., 30 Church St., New York, N. Y.

Editor, Elmer T. Howson, 608 So. Dearborn St., Chicago, Ill.

Managing Editor, Walter S. Lacher, 608 So. Dearborn St., Chicago, Ill.

Business Manager, F. C. Koch, 30 Church St., New York, N. Y.

2. That the owner is:

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state) There are none.

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E. A. SIMMONS,
President.

Sworn to and subscribed before me this 26th day of March, 1927.

[SEAL] H. D. NELSON,

(My commission expires March 31, 1927.)

No. 520-600

One of many types for railroad use. Cover can be raised to make connections and then bolted to the floor. Two-stream projector, automatic stream control!

# The Favorite of the Largest Railroads

On the largest railroad systems of the country, in shop, terminal, office or corridors, you'll find Halsey Taylor Drinking Fountains. Known for years as the most sanitary and practical side-stream type made, these fountains will meet

**AUTOMATIC STREAM CONTROL**

No other fountain has this Taylor feature. No matter what the pressure variation, the stream remains at the same uniform, practical height, and always in the bowl!

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This Code, (U. S. Health Dept.) distinctly recognizes angle-stream projection as the safest and best for railway practice! Halsey Taylor Drinking Fountains are the most sanitary side-stream types because of the two-stream projector (making it impractical to drink from the source of supply) and the most practical, because of automatic stream control! Write for literature.

**The Halsey W. Taylor Co.**
WARREN, O.

**HALSEY TAYLOR**
*Drinking Fountains*

Automatic Stream Control
Practical Side-Stream

## THE ADVANTAGES OF USING HOLMES SELF-BORING LAG SCREWS FOR FASTENING ALL SIGNAL AND SWITCH PLATES ARE:

First—Installation Costs Cut To The Minimum

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Fourth—Will Keep Constant Holding Power

Fifth—The Heads Will Set Square On Plates

Sixth—Heads Are Filleted Underneath Making For Strong Construction

*Write us about Holmes Self-Boring Screw Spikes*

**The Malleable Screw Products Co., Inc.**
Cincinnati, Ohio

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## Switches - Frogs - Crossings

For points where the service is severe, *Tisco* Manganese Steel should be specified.

NO other metal for Trackwork inherently possesses the quality of automatically hardening itself on the surface under the wheel loads and at the same time preserving a tough background.

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# Just One Second

## From Molten Metal to

BETWEEN the ticks of your watch, modern machinery converts a pool of molten metal to a length of MONO-CAST PIPE.

One second the molten iron lies still in the bottom of the sand-lined mold. The next, the mold is spinning at high speed. Within the mold, centrifugal force has distributed the molten metal evenly, over the sand-lined walls. A MONO-CAST PIPE has been molded—and as a unit.

This simultaneous molding prevents casting strains. The sand-lining prevents chilling. The result is a fine grained, dense, homogeneous structure, which resists impact and bends without breaking.

We want to see you at the A. W. W. A. Convention, Chicago, June 6 to 11.

AMERICAN CAST IRON PIPE COMPANY

ACIPCO MONO-CAST CENTRIFUGAL PIPE

BELL AND SPIGOT



# "Use the rest of my men dressing track"

"I FIND the Bloxham track liner to be a great labor saver. We have 90 lb. rail—39 ft. I can take 3 men and line with perfect ease and use the rest of my men dressing track."

This is an extract from a letter recently received from a road-master in Mississippi. He has found that the Bloxham liner is cutting his cost of lining track.

Not only the testimony of the man who uses them but an engineer's report on a competitive test and time study are convincing evidence of the economy of the Bloxham track liner.

*Write us for a demonstration and a copy of the engineer's test report*

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# BLOXHAM

## Track Liners

RE&M5-Gray

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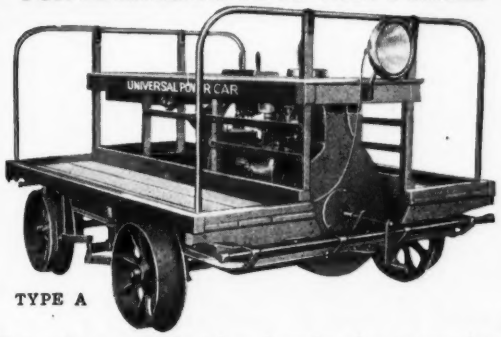
**FOR MAINTENANCE-OF-WAY FORCES**




TYPE A

Takes the men to the job and works when it gets there

## A GAS-ELECTRIC POWER PLANT

Develops 110 volts a.c. and d.c. current for operating all Electric Tools such as Grinding Tools, Portable Rail Saws, Track and Bonding Drills, Electric Tie Tampers, Flood Lighting Systems, Portable Saws and Boring Tools for Carpenters and Bridge Gangs, Electric Driven Air Compressors for Sand-Blasting and Paint Spraying, and all other Electric Tools Essential to maintenance work.

**DEPENDABLE—ECONOMICAL—FLEXIBLE**

CAN BE OPERATED BY UNSKILLED WORKMEN

Electrically Driven, No Friction Discs, Gear Shifts or Clutches
Four men Can Easily Remove Car from Tracks

**THE EUCLID ELECTRIC & MFG. CO.**
**EUCLID, OHIO**



# Universally used by leading railroads

The fact that Genasco Asphaltic Protective Products are in such extensive and continuous use by the leading railway systems marks them as the standard. Their long wear is appreciated everywhere. We will gladly send you full information regarding any or all of these Genasco products:

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Genasco Battery Seal Asphalt
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**THE BARBER ASPHALT COMPANY**
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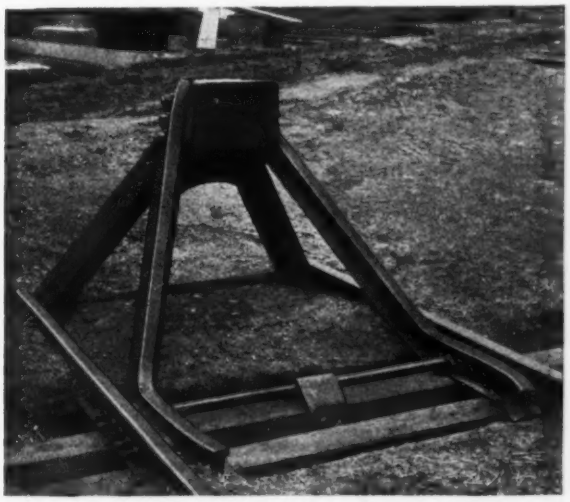
# One more advantage added—

Along with its other advantages of ease of installation, low cost of installation, low cost of maintenance the DURABLE has always been known as a post that would take more punishment and stop more cars without needing repairs than any other post on the market.



The Improved Durable

Now we have added one more advantage to the above list—to meet changing conditions in railroad work.

We have added a strengthening element that makes it possible for the DURABLE to maintain its reputation of stopping any car including the new, far heavier freight cars.

It is an extra-heavy, solid, forged steel spreader bar placed between the bumping post rails where they join the running rails. It is strengthened and anchored at the center with a heavy stirrup which ties it to the tie underneath.

This means added assurance that a track end, protected by a DURABLE is insured against tragic and expensive accidents.

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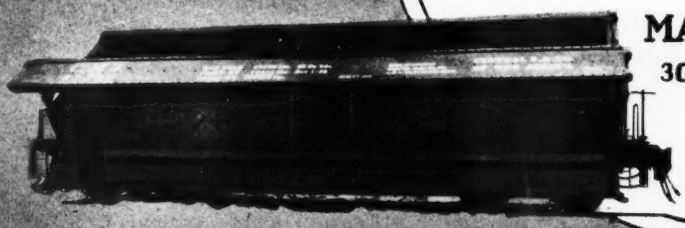
**Union Stock Yards** **Chicago**

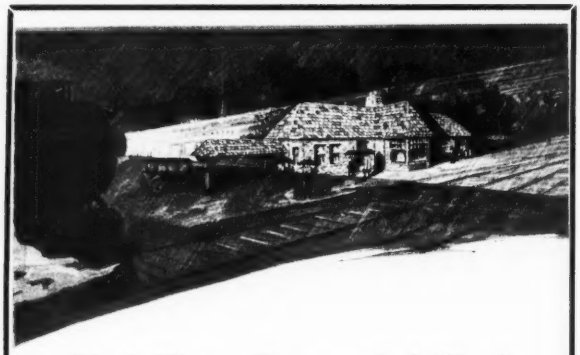
# MAGOR

## AUTOMATIC AIR DUMP CARS

THE highly developed mechanical details of these cars assure satisfactory results; lower operating cost, greater safety in operation, quick and complete discharge are distinctive Magor features.



**MAGOR CAR CORP.**
30 Church St. New York N.Y.



## Unfailing Dependability!

As the old trusted "vet" takes justifiable pride on his unbroken record for *dependability — irrespective of weather conditions* — so does the firm of Mule-Hide feel *that* certain thrill of satisfaction which comes from having served faithfully the many thousand clients who have entrusted their roofing problems to our care.

*That* responsibility we are ever ready to assume when you are ready to charge us with it.

MULE-HIDE ROOFS

THE LEHON COMPANY
44th to 45th Street on Oakley Avenue, Chicago

## DEAN-WILLIAMS WEED DESTROYER

*(Patented)*

Kills Vegetation and Clears Frogs and Switches of Snow and Ice with Super-heated Steam

## MAINTAINS A CLEAR TRACK AT ALL TIMES

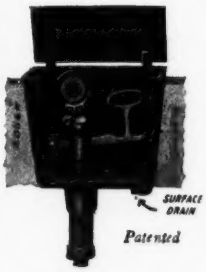
**Will not cause fires or poison stock. Performs the work of many men.**

*Inquiries and Investigation Solicited*
*Correspondence Answered Promptly*

**DEAN-WILLIAMS WEED DESTROYER COMPANY**
2124 West 11th St., Little Rock, Arkansas

# Air Leaks

**LEAVE NO MARK**




**Murdock Air Box No. 2**

Therefore it is especially important to use a valve that is positive in closing—that cannot be left partly open — that will not leak.

*Write for descriptive Pamphlet*

Railway Water Service Boxes
Anti-freezing Hydrants and Drinking Fountains
Q. O. C. (Quick Opening and Closing) Valves for Water and Air

**The Murdock Mfg. & Supply Co.**
**Cincinnati, Ohio**

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This condensation has permitted the author to do what few have done previously—make the least demand upon the readers' time in giving him the meat of modern maintenance practice. Your best bet is "Roadway and Track" if you want facts you can apply to your own work. You may keep this book for 5 days without cost. Order today.

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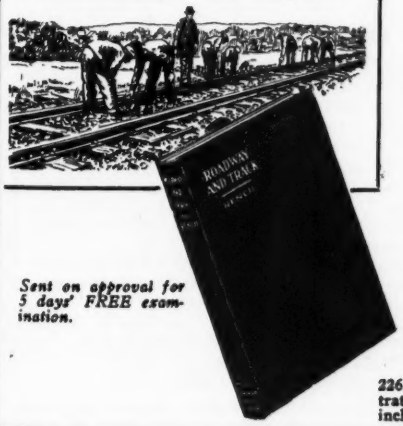


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**226 pages, 44 illustrations, cloth 6 x 9 inches, $3.50.**

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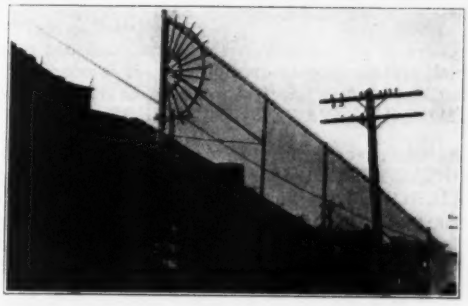
*America's first wire fence since 1883*

*Along congested rights of way*

*For yards, shops, and round houses*



*For stations and bridge approaches*

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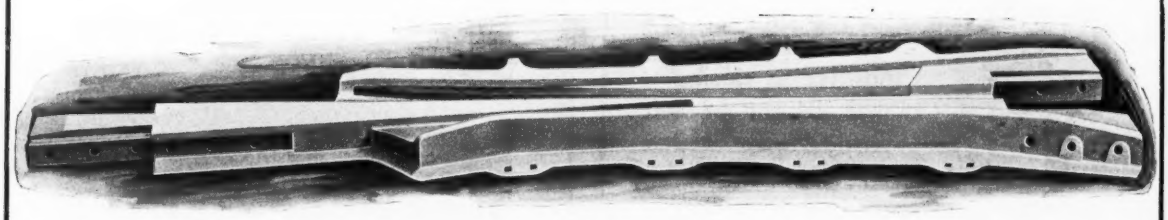
**Self-Guarded**
# SPRING FROG
**Patented Oct. 21, 1924**

**ENDURABLE ECONOMICAL EFFICIENT**



**ELIMINATES SEPARATE GUARD RAILS**
**HAS ONLY TWO PARTS**

excluding springs and spring bolts

MANUFACTURED BY

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We make LIME-SODA WATER SOFTENERS of both the ground operated and top operated types to purify water for prevention of scale deposits and corrosion in locomotive boilers.

There is no investment that a railroad can make which will yield greater dividends, if it operates in a hard water district, than to invest in AMERICAN LIME-SODA WATER SOFTENERS.

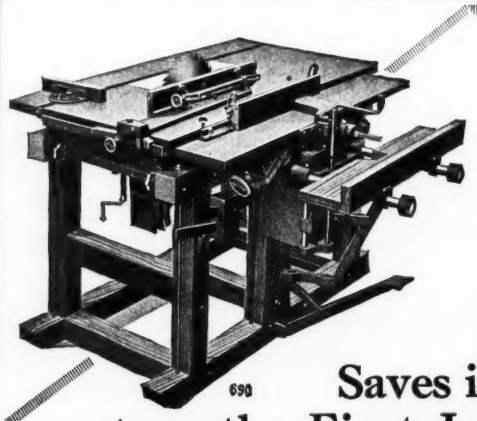
At the present time we are installing WATER SOFTENERS on four well-known AMERICAN RAILROADS, on which we made our first installations more than twenty years ago. These plants represent additional repeat orders we have gotten for new plants and enlargements during this time.

Will you please let us have your specifications for water treating plants?

We are qualified by organization and experience to give you service. Write for our literature.

**AMERICAN WATER SOFTENER CO.**
FAIRHILL P. O. PHILADELPHIA, PA.

*Specialists for twenty-four years in Railroad*
**WATER PURIFICATION**

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This American Portable Variety Woodworker lets you do any woodworking operation of either a routine or special nature right on the job. Figure the saving over hand or shop work! Hundreds are now in use.

This one machine may be used as a rip or cut-off saw, as a dado, gaining, grooving, rabbiting, tenoning or boring machine, as a jointer or planer, a matcher, molder or sander and as a hollow chisel mortiser.

Let us send you our Bulletin No. 80 describing our full line of Woodworking Machines for use on the job or in the shop.

**American Saw Mill Machinery Co.**
**164 Main Street, Hackettstown, N. J.**
*"American" Saw Mills and Woodworkers*

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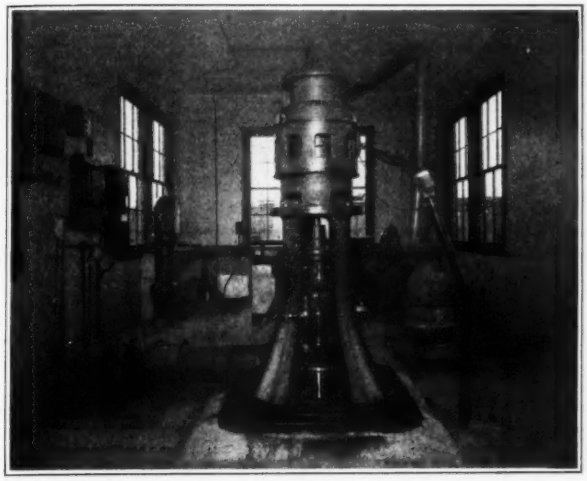
## serve the Leading Railroads



Layne Wells Serve the Louisville & Nashville at Memphis

The representative roads of the country use Layne Well Systems.

Their dependability, low maintenance and high efficiency make them popular with railroads.

Layne Well Systems will produce more water at less cost per thousand gallons than any other known method.

## Layne & Bowler Manufacturing Company

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## Save Old Switch Points!

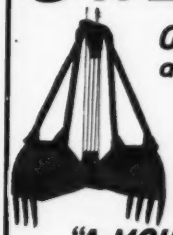
Let us explain our new method of reclaiming worn switch points, sending them back into service to last longer than new ones. A practical economy you should not overlook.

## "Tym-Ber-Slab" Grade Crossings

are proving the most practical of any type now in use—They last longer—Smoother—Quickly installed—Remove and replace without damage—Cost no more—They are perfection—WRITE US

**INTER-STATE CAR AND FOUNDRY CO.**
**INDIANAPOLIS, INDIANA**

# OWEN BUCKETS



*Greater Digging Power and Bigger Grabs than any other bucket of the same capacity*

**THEY GET**
***"A MOUTHFUL AT EVERY BITE"***

Owen Buckets operate with remarkable speed, yet smoothly and easily, insuring efficient crane operation.

Full loads and continuous performance cut down rehandling costs. You are taking no chance when you use Owen Buckets—"They get a Mouthful at Every Bite."

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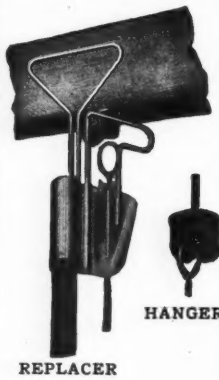
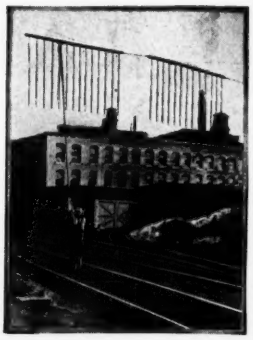



*Do You Know?*

**TELL-TALES** On Bridge and Tunnel Warnings

Can now be taken down and replaced by one man from the ground.
No more need of sending a crew of 3 or 4 men over your road with a long ladder, and climbing to the cross arm.
No more tangling of tell-tales.
BRONZE HANGERS — no corrosion or rust — everlasting — TELL-TALES of spring brass rods and treated rope, most resistant to bending.
You can eliminate almost your entire labor and replacement costs and make your bridge and tunnel warnings 100% efficient.
Avoid death and injuries to employees.

**Hastings Signal & Equipment Co.**
53 State Street Boston, Mass.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**HUNT**

Special H Inspection

**of Rails**

Is Used By

**More Than Half**

of the
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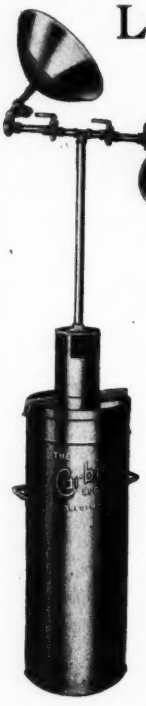
*Engineers*
**2200 Insurance Exchange, Chicago**

**Large or Small—**
*We Have Them All*



Carbic supplies the demand for all portable lighting, whether that demand be for large illumination requiring 16,000 candle power lights or for other requirements of lesser illumination down to 600 candle power.

The efficient operation of Carbic lights is credited to the fuel: Carbic Cakes.

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CARBIC MANUFACTURING CO.
NEW YORK — DULUTH, MINN. — CHICAGO
GENERAL OFFICE
CARBIC PRODUCTS STOCKED IN OVER 75 CITIES


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**RAILWAY ENGINEERING AND MAINTENANCE**
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**608 South Dearborn Street, Chicago**

An old line manufacturer will divide profits with live agents with records, acquainted with M. W. officials in all railroad centers. Address Box 272, Railway Engineering and Maintenance, 30 Church Street, New York City.

# "Anchor" Track Braces

A simple low cost device for strengthening the track at weak or defective places. Use a few Anchor Track Braces at sharp curves, switches, places where the ties are rotted, or where the spikes are loose, or at any bad part of the track where needed. Usually one brace about every three yards is sufficient.

They prevent track spreading, rails turning or creeping, spikes lifting and similar troubles. Are a time saver for quick repairs. Will strengthen temporary tracks. Can be installed by one man in four minutes, and used over and over again. Are furnished insulated if desired. Send for bulletin.

Patented Nov. 16, 1926
They hold the rail like in a vise. The lugs are self adjusting, so that one size brace fits on six different weights of rail.

Manufactured by

**T. H. EDELBLUTE COMPANY**
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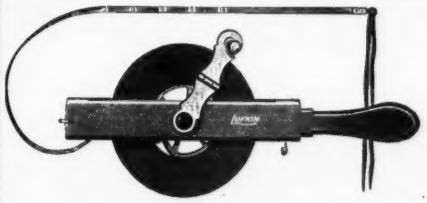
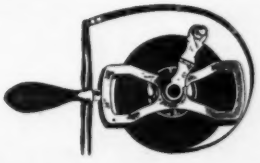
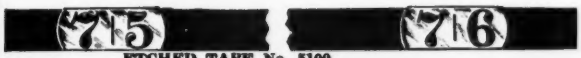
Also manufacturers of "Anchor" Rerailers

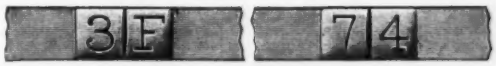


# LUFKIN CHAIN TAPES






ETCHED TAPE No. 5100
A sturdy tape best for all precise chaining work.
½-gage mark when specified.




"MICHIGAN" CHAIN TAPE
Graduated on Babbitt Metal
Most popular for rough survey and maintenance work.
½-gage mark when specified.

ENGINEER'S PATTERN TAPES — WOVEN TAPES OF ALL GRADES

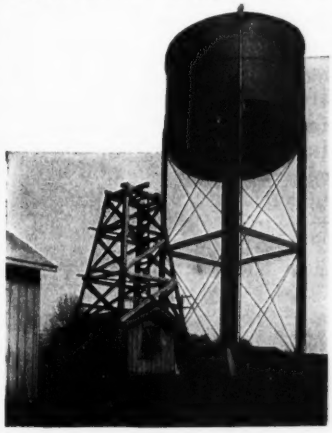
*Send for Catalogue*

WINDSOR, ONT. LONDON, ENG. **THE LUFKIN RULE CO.** SAGINAW, MICH. NEW YORK

# Now You Can Depend On Shallow Wells

When your shallow well slows up, the trouble is generally "screen choke." There is plenty of water below, but a clogged strainer has reduced your inflow. "Screen choke" can now be prevented by the

**Air Made Well Process**



Sullivan Air Lift at Forest, Miss., Alabama and Vicksburg Ry.

The sand is pumped out and replaced by coarse gravel. The collecting basin grows larger and larger and you get more and more water from the same well.

The Sullivan Air Lift Pumping system is especially advantageous for railroad service. There are no moving parts in the well, and all machinery and controls for a group of wells are in one station. There's no trouble from sand or mud, changing water levels, or crooked wells.

*Write today for 48-page handbook, 1971-I*

**Sullivan Machinery Company**
**411 Peoples Gas Bldg., CHICAGO**

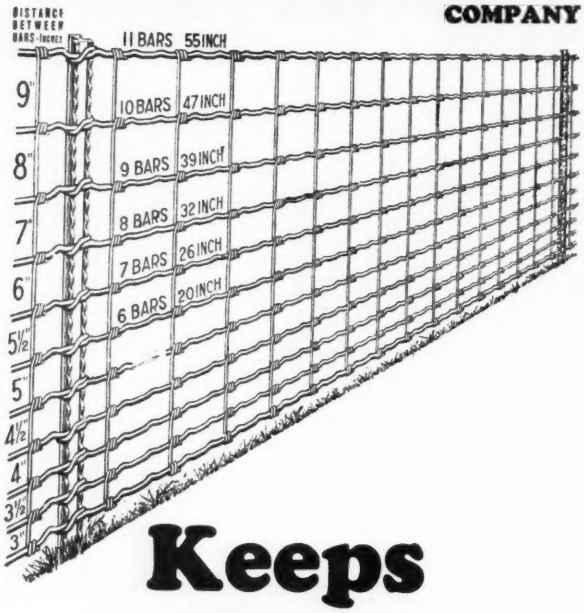
# WHY RISK DERAILMENTS

and the subsequent damage, when you can keep your tracks from spreading by the application of Gauge Rods? They will help save your ties and reduce your track maintenance costs.

We recommend them for use on curves, at the point of switches, at coaling stations, at watering stations and other locations where you have difficulty in maintaining the proper gauge of your tracks.

**LOUISVILLE FROG & SWITCH CO.**
Louisville Kentucky

# American Steel & Wire COMPANY




# Keeps Out Stock and Trespassers

## Protects You and the Public

Railroads using American Railroad Fence erected on Banner Steel Posts save thousands of dollars yearly in damage claims . . . and likewise prevent accidents caused by live stock being on the tracks.

*Steel Posts Save Labor*

*On a leading railroad one man by test drove 5 Banner Posts in the time it required to set one wooden post*

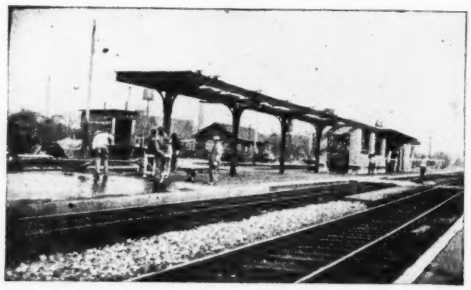
This company was the pioneer in introducing right-of-way fences now recommended for railroad use by the American Railway Engineering Association.

**American Steel & Wire Co.**

*DEALERS EVERYWHERE*

*Sales Offices: Chicago, New York, Boston, Cleveland, Worcester, Philadelphia, Pittsburgh, Buffalo, Detroit, Cincinnati, Baltimore, Wilkes-Barre, St. Louis, Kansas City, St. Paul, Oklahoma City, Birmingham, Memphis, Dallas, Denver, Salt Lake City*

# *Nothing to be displaced by dragging train equipment*



# HEADLEY NO. 1

A LOOSE stone or brick may easily trip a passenger resulting in serious injury. A platform of Headley No. 1 is strong, smooth and possesses a degree of wear resistance that makes it cheapest in the end.

**Headley Good Roads Company**

Franklin Trust Building

**Philadelphia** **Pa.**

*Use* DIXON'S Silica Graphite Paint to protect all metal and wood surfaces.

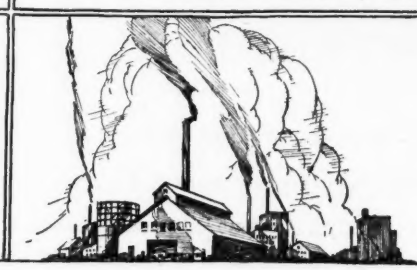
The pigment, flake silica-graphite, provides a tough, yet elastic, film that withstands heat and cold without cracking or peeling off. The graphite and silica are naturally combined resulting in long life and efficient surface protection.

*Write for long service records and Color Card No. 187-B.*

**Joseph Dixon Crucible Company**

**Jersey City** D X N TRADE MARK **New Jersey**

**1827 One Hundredth Anniversary 1927**



The FAIR

The Rail Anti-Creeper That's Always Been Right

That the basic principle of the modified FAIR Rail Anchor is scientifically correct, is proven by the fact that no change has ever been necessary.

This is a record that is incomparable.

THE P. & M. CO.

Chicago New York

Montreal London Paris Calcutta Sydney

# Buyers' Guide

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**Acetylene Dissolved**
Oxweld Railroad Service Company

**Acetylene Lights**
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Ingersoll-Rand Co.
Sullivan Machinery Co.

**Air Generator Set**
Buda Company

**Air Hoists**
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Sullivan Machinery Co.

**Air Lift Pumping Machinery**
Ingersoll-Rand Co.
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**Coal, Ore & Ash Handling Machinery**
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Buda Co.
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Q & C Co.
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Q & C Co.
Ramapo Ajax Corp.
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Buda Co.
Kalamazoo Railway Supply Co.

**Jacks, Smoke**
Johns-Manville Corp.

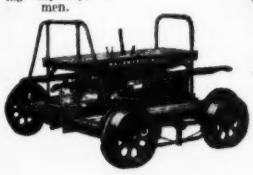
**Jacks, Track**
Buda Company
Hackmann Railway Supply Co.
Kalamazoo Railway Supply Co.
Verona Tool Works

*"Kalamazoo Means Service to You"*

So extensive is the Kalamazoo Line of Railway Motor Cars that you do not have to step out of it to find the car you want for any service. It includes small two passenger cars for signalmen, roadmasters, and inspectors; medium-sized cars for section gangs, bridge gangs and hump crews; huge 30-passenger cars for large hump crews or construction gangs—also frequently used in place of locomotives and train crews in hauling materials to and from a job.

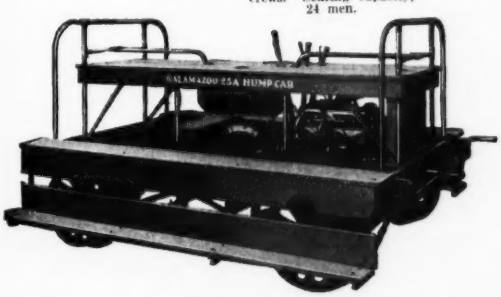
The Kalamazoo Line makes it possible for you to use Kalamazoo Cars exclusively—assuring you the same excellent performance from every car in your service.

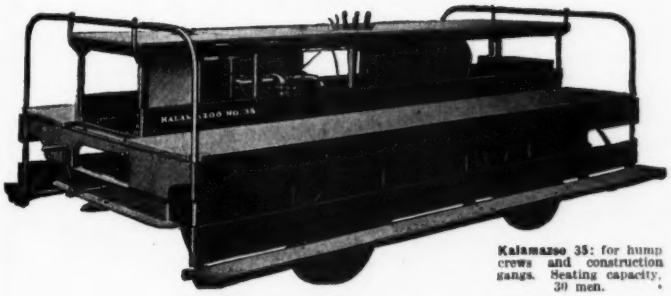
**Kalamazoo 16L:** for signalmen, roadmasters and inspectors. Seating capacity, 2 men.



**Kalamazoo 23:** for section gangs and bridge gangs. Seating capacity, 8 to 10 men.

**Kalamazoo 25A Hump Car:** for section gangs, bridge gangs and hump crews. Seating capacity, 24 men.





**Kalamazoo 35:** for hump crews and construction gangs. Seating capacity, 30 men.

KALAMAZOO

# KALAMAZOO RAILWAY SUPPLY CO.

## KALAMAZOO MICHIGAN U.S.A.

New York, Chicago, St. Louis, St. Paul, New Orleans, Denver Spokane, Seattle, Portland, Ore., Havana, London, Mexico City, Johannesburg, Vancouver, Winnipeg, Montreal.

# BUYERS' GUIDE

**Joints, Compromise**
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Rail Joint Co.

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**Rail Bonds**
Verona Tool Works

**Rail Braces**
Coover Railroad Track

**Rail Braces**
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**Rails, Tee**
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Carnegie Steel Co.

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Lehon Co.

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American Saw Mill Machy. Co.

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Fairbanks, Morse & Co.

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Fairbanks, Morse & Co.

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**Screw Spike Drivers**
Ingersoll-Rand Co.

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Barber Asphalt Co.
Lehon Co.

**Sheet Iron**
Armco Culvert & Flume Mfrs. Ass'n.

**Sheets, Corrugated**
Johns-Manville Corp.

**Shingles, Composition**
Barber Asphalt Co.
Lehon Co.

**Shovels**
Ames Shovel & Tool Co.
Interstate Car & Foundry Co.
Verona Tool Works
Woodings Forge & Tool Co.

**Siding, Corrugated and Plain**
Johns Manville Corp.

**Signal Foundations, Concrete**
Massey Concrete Products Corp.

**Signals, Bridge Warnings**
Hastings Signal & Equip. Co.

**Skid Excavators & Dredges**
Hayward Co.

**Skid Shoes**
Q & C Co.

**Slabs, Concrete**
Massey Concrete Products Corp.

**Smoke Stacks**
Massey Concrete Products Corp.

**Snow Melting Devices**
Q & C Co.

**Snow Plows**
Jordan Co., O. F.
Q & C Co.

**Spike Pullers**
Louisville Frog & Switch Co., Inc.

**Spikes**
Bethlehem Steel Co.

**Spreader Cars**
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**Spreaders, Ballast**
See Ballast Spreaders

**Standpipes (Penstock)**
Fairbanks, Morse & Co.

**Stands, Switch & Target**
Bethlehem Steel Co.
Q & C Co.
Ramapo Ajax Corp.

**Steel, Alloy**
Central Alloy Steel Corp.

**Steel Cross Ties**
Carnegie Steel Co.

**Steel Plates and Shapes**
Bethlehem Steel Co.
Carnegie Steel Co.

**Step Joints**
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**Storage Tanks**
Pittsburgh Des Moines Co.

**Structural Steel**
Bethlehem Steel Co.
Carnegie Steel Co.

**Switches**
Bethlehem Steel Co.
Buda Company
Conley Frog & Switch Co.
Interstate Car & Foundry Co.
Louisville Frog & Switch Co., Inc.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr. & Co., Wm.

**Switchmen's Houses**
Massey Concrete Products Corp.

**Switchpoint Protector**
Fleming Co.
Maintenance Equipment Co.

**Switchstands & Fixtures**
Bethlehem Steel Co.
Buda Co.
Ramapo Ajax Corp.
Wharton Jr. & Co., Wm.

**Tampers, Tie**
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**Tank Fixtures**
Fairbanks, Morse & Co.

**Tanks, Steel**
Pittsburgh Des Moines Co.

**Tape, Insulating**
Johns-Manville Corp.

**Tapes, Measuring**
Lufkin Rule Co.

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**Telephone Service, Long Distance**
American Telephone & Telegraph Co.

**Telegraph Poles**
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**Telegraph Service, Long Distance**
American Telephone & Telegraph Co.

**Telltales**
Hastings Signal & Equipment Co.

**Testing of Materials**
Hunt Co., Robert W.

**Thawing Outfits**
Q & C Co.

**Thermit Welding**
Metal & Thermit Corp.

**Ties**
International Creosoting & Construction Co.

**Tie Plates**
Bethlehem Steel Co.
Illinois Steel Co.
Lundie Engineering Corp.
Sellers Manufacturing Co.
Track Specialties Co.

**Tie Plate Clamps**
Q & C Co.

**Tie Rods**
Bethlehem Steel Co.

**Tie Spacers**
Maintenance Equipment Co.

**Tie Tampers**
Electric Tamper & Equipment Co.
Ingersoll-Rand Co.
Syntron Co.

**Timber, Bridge**
Interstate Car & Foundry Co.

**Timber, Creosoted**
International Creosoting & Construction Co.

**Timber, Slab**
Interstate Car & Foundry Co.

**Tile, Roofing**
Federal Cement Tile Co.

**Tools, Oxy-Acetylene Cutting & Welding**
Oxweld Railroad Service Co.

**Tools, Pneumatic**
Ingersoll-Rand Co.

**Tools, Track**
Ames Shovel & Tool Co.
Buda Co.
Maintenance Equip. Co.
Q & C Co.
Verona Tool Works
Woodings Forge & Tool Co.

**Tongue Switches**
Bethlehem Steel Co.
Buda Co.
Ramapo Ajax Corp.
Wharton Jr. Co., Wm.

**Torches, Oxy-Acetylene Cutting & Welding**
Oxweld Railroad Service Co.

**Track Braces**
T. H. Edelblute Co.

**Track Drills**
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**Track Gages**
Buda Co.
Kalamazoo Railway Supply Co.
Louisville Frog & Switch Co., Inc.

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**Track Liners**
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**Treating Plants, Water**
American Water Softener Co.

**Trestle Slabs**
Massey Concrete Products Corp.

**Tunnel Warnings**
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**Ventilators**
Johns-Manville Corp.

**Warning Devices, Bridge & Tunnel**
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Dean-Williams Weed Destroyer Co.
Woolery Machine Co.

**Weed Killer**
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Dean-Williams Weed Destroyer Co.
Q & C Co.

**Welding, Thermit**
Metal & Thermit Corp.

**Welding, Oxy-Acetylene**
Carbic Mfg. Co.
Oxweld Railroad Service Co.

**Welding & Cutting Equipment**
Oxweld Railroad Service Co.

**Well Systems**
Layne & Bowler

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Fairbanks, Morse & Co.
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

**Wheels, Wrought Steel**
Carnegie Steel Co.

**Windshields**
Mudge & Co.
Fairbanks, Morse & Co.

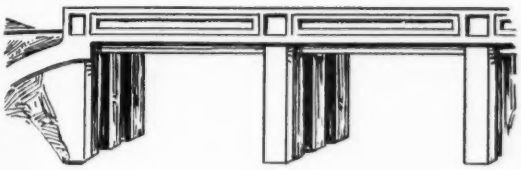
**Wire Fencing**
Cyclone Fence Co.
Page Fence Association

**Wood Preservation**
See Preservation, Timber

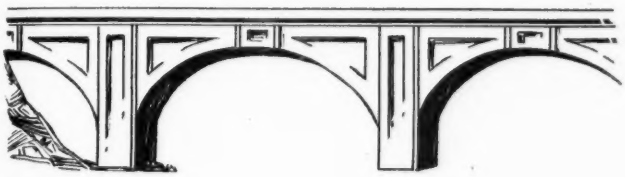
**Woodworking Machinery**
American Saw Mill Machinery Co.

# WHAT EVERY ENGINEER KNOWS

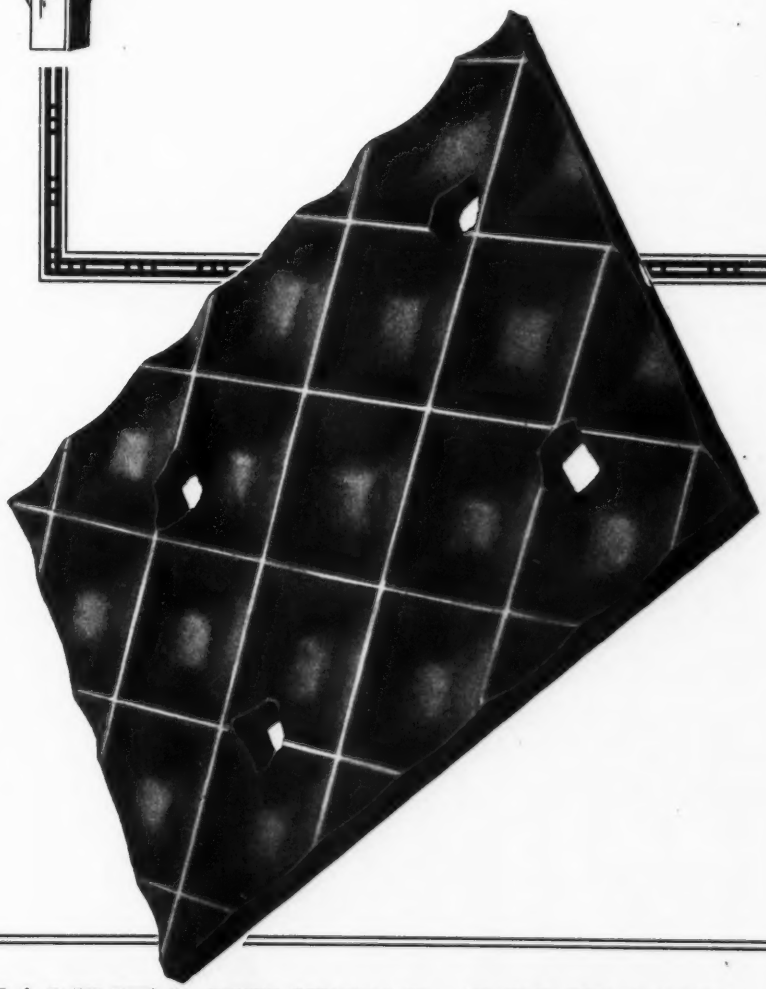
## *The Arch is Stronger Than the Flat Truss*



The Sellers Wrought Iron Tie Plate, with the Arched-Bottom, takes advantage of this engineering fact—adding 10% more strength to a tie plate of equal weight, or giving equal strength to a tie plate of 10% less weight.



This organization and its facilities represent fifty years of manufacturing experience.



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**Illinois Merchants Bank Bldg., Chicago, Illinois**

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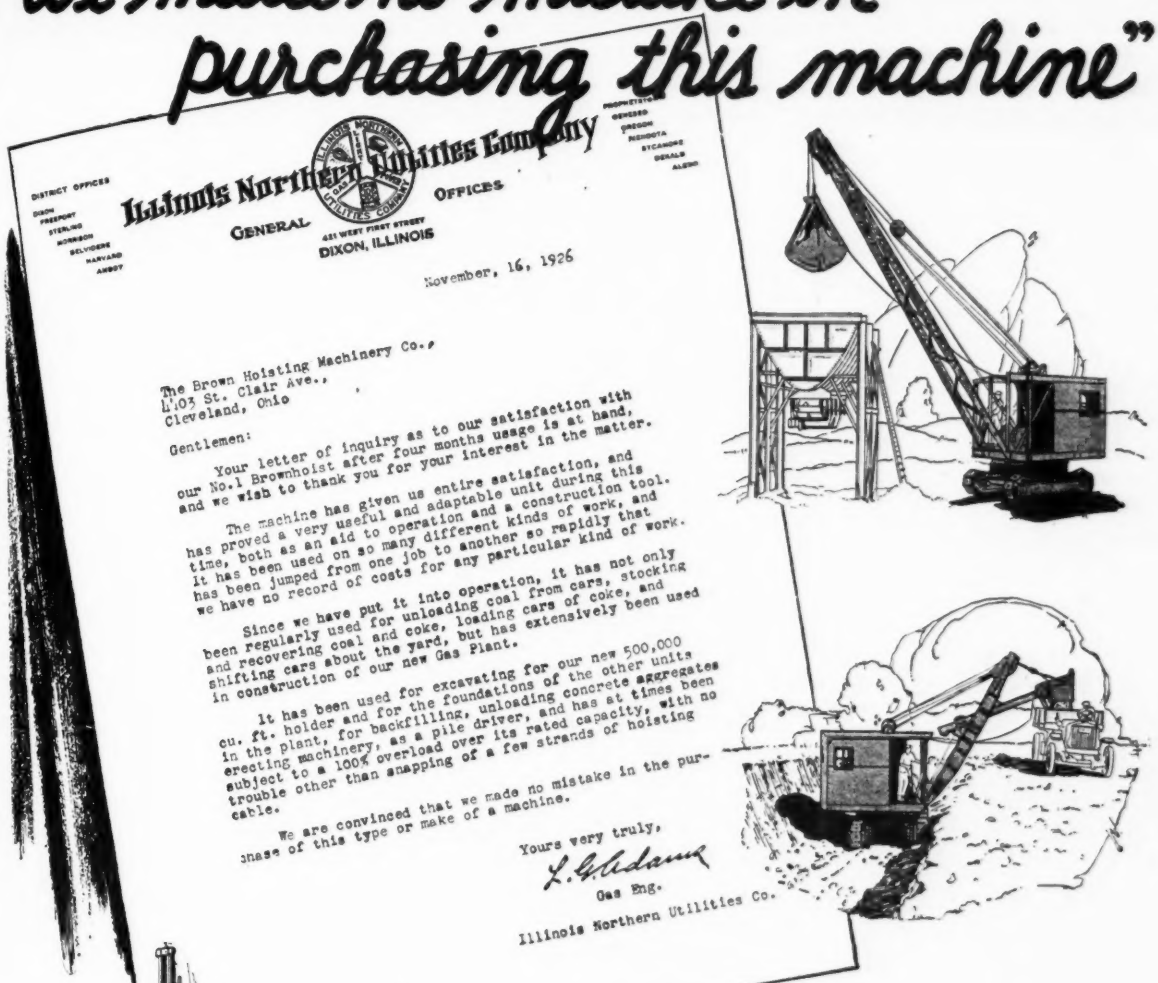
# "We made no mistake in purchasing this machine"



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November, 16, 1926

The Brown Hoisting Machinery Co.,
1103 St. Clair Ave.,
Cleveland, Ohio

Gentlemen:

Your letter of inquiry as to our satisfaction with our No.1 Brownhoist after four months usage is at hand, and we wish to thank you for your interest in the matter.

The machine has given us entire satisfaction, and has proved a very useful and adaptable unit during this time, both as an aid to operation and a construction tool. It has been used on so many different kinds of work, and has been jumped from one job to another so rapidly that we have no record of costs for any particular kind of work.

Since we have put it into operation, it has not only been regularly used for unloading coal from cars, stocking and recovering coal and coke, loading cars of coke, and shifting cars about the yard, but has extensively been used in construction of our new Gas Plant.

It has been used for excavating for our new 500,000 cu. ft. holder and for the foundations of the other units in the plant, for backfilling, unloading concrete aggregates erecting machinery, as a pile driver, and has at times been subject to a 100% overload over its rated capacity, with no trouble other than snapping of a few strands of hoisting cable.

We are convinced that we made no mistake in the purchase of this type or make of a machine.

Yours very truly,
L. G. Adams
Gas Eng.
Illinois Northern Utilities Co.

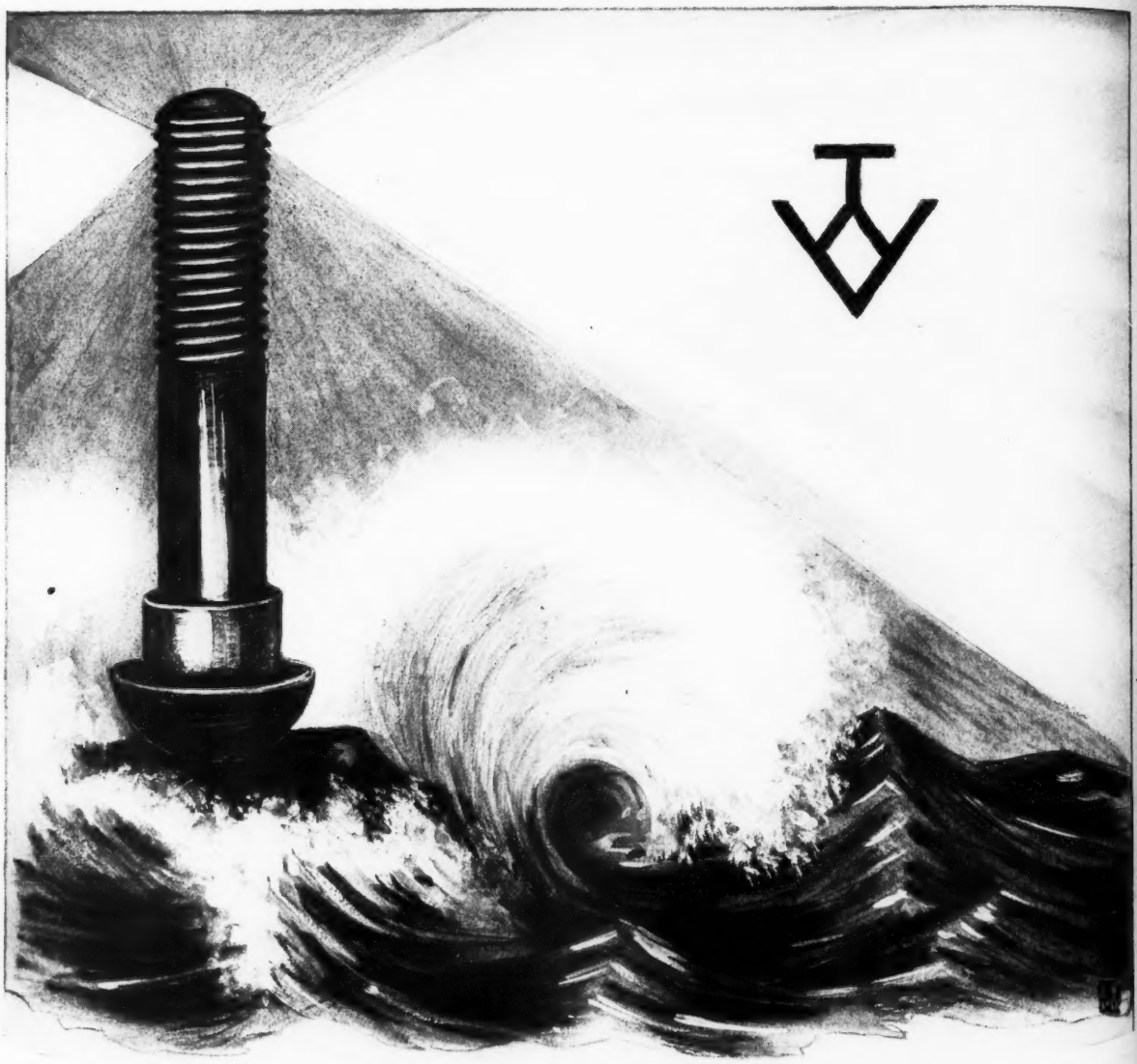
**The small Brownhoist gas shovel-crane referred to makes an ideal handling unit. Operated by one man, it goes anywhere on its creeper mounting, does the work of a whole labor gang and is adaptable to all sorts of handling. And its first cost is relatively low.**

**The Brown Hoisting Machinery Co., *Cleveland, O.***

Branch Offices: New York, Chicago, Pittsburgh, New Orleans and San Francisco.

# BROWNHOIST

GOOD MATERIAL HANDLING MACHINERY



# Lonesome bolts

Proverbially, the most lonely job in the world is that of a lighthouse keeper between the visits of the supply ship.

A track bolt, between the periodical visits of a tightener, is in much the same position. It must be absolutely self-sufficient. It must derive its tightness from the original wrenching. It cannot look outside itself for help. Even with a circular nut-lock, it is a self-contained unit. Alone and unaided it must fight the three causes of looseness—stretch, rust, and wear.

But when Verona Rail Joint Springs are used, the lonely condition disappears. The springs couple the bolts in pairs. The reactive pressure, many times greater than that of the most powerful nut-lock, is secured in part from the bolt on which it is exerted and in part from the neighboring bolt. The shock of the rolling load is distributed and shared. In the event of stretch, rust, or wear, the stronger bolt aids the weaker, the tighter helps the looser.

VERONA TOOL WORKS PITTSBURGH